G. <u>Restart Test Plan</u>

The purpose of the Restart Test Plan is to perform restart testing necessary to ensure the integrity of the RCS and the containment pressure vessel, and to evaluate proposed testing of systems and components affected by RCS leakage and boric acid deposits. In addition, an integrated restart process is in place to ensure that proper sequencing of required restart activities is accomplished prior to mode ascension.

This plan has four key elements to ensure that comprehensive testing is performed prior to and during restart, and that restart activities have been completed to ensure that Davis-Besse is in a condition to support sustained safe and reliable operation. These elements include:

- <u>RCS Leakage Tests and Inspections</u> – Testing the RCS, including components within the Reactor Coolant Pressure Boundary (RCPB) and associated piping exposed to full RCS pressure, to ensure integrity following replacement of the RPV head and maintenance of RCS piping and components. The leakage inspections include the RPV head, control rod drive nozzles and the reactor bottom incore nozzles. The results of these tests and inspections are described in Sections IV.B and IV.C, above.

- <u>Containment Integrated Leak Rate Testing</u> – Testing the containment by performing an ILRT in accordance with 10 CFR Part 50, Appendix J (Type A test) to ensure the integrity of containment following restoration of the containment pressure vessel. The results of this test are described in Section IV.B, above.

- <u>Post-Maintenance and Post-Modification Testing</u> – Evaluating the adequacy of proposed post-maintenance and post-modification testing on systems and components affected by RCS leakage and boric acid deposits to determine if additional testing is required.

- <u>Integrated Restart Process</u> – An integrated restart process, encompassing four plant startup, heatup, and operations procedures (DB-OP-06911, -06900, -06901, and -06902), is in place to ensure required restart activities, tests, and inspections are performed prior to mode ascension. These procedures identify the sequence of critical steps, procedures, and tests that must be performed to safely restart Davis-Besse and include the necessary administrative controls required to authorize mode changes during plant restart.

In summary, Davis-Besse has performed and will be performing comprehensive testing to ensure that it is ready for safe and reliable operation.

H. **Restart Action Plan**

1. Description of the Plan

The Restart Action Plan established a mechanism for identification, monitoring and control of restart actions under the Davis-Besse Return to Service Plan. The Restart Action Plan also established a process and criteria for the evaluation, disposition, and closure of restart-identified actions and has provided for the effective interaction with the NRC during the IMC 0350 Reactor Oversight Process. This plan provided the actions that the management team at Davis-Besse performed to ensure that the plant is restarted in a safe and reliable manner and that the long-term performance of the plant will be sustainable. After NRC approval to restart has been received, final authority to restart the plant resides with the FENOC Chief Operating Officer.

The Davis-Besse Restart Action Plan has been implemented by a procedure that provides details of the responsibilities and activities required to administer and control this Restart Action Plan Building Block. After restart the attached long-term Operational Improvement Plan for Cycle 14 will be used to ensure continued improvements and sustained performance in nuclear safety.

As discussed below, there were four significant phases of the Restart Action Plan process to be accomplished to return Davis-Besse to safe and reliable operations: (1) planning; (2) discovery; (3) implementation; and (4) validation/closure. The NRC has inspected these phases and stated that it will close the associated Restart Checklist Item 5.a in Inspection Report 50-346/03-22.

Planning

The planning phase ensured that restart issues were properly and thoroughly identified and characterized during the discovery phase. In addition, planning ensured that personnel were properly trained and qualified to perform discovery activities. Planning was accomplished by development of:

- Building Block Plans;
- Building Block Discovery Action Plans;
- Implementing Procedures;
- Restart Implementation Action Plans;
- Training; and
- Schedules.

Discovery

Many of the Building Block Plans included “discovery” activities. The discovery phase consisted of performing the activities identified in Discovery Action Plans using implementing procedures, and by the day-to-day activities associated with Operations, Maintenance, and Engineering. Emergent issues and findings identified during the performance of the implementing procedures were documented on CRs and evaluated for corrective action prior to restart.

The RSRB reviewed over 16,300 CRs and 19,000 CAs to designate those items that needed to be completed prior to restart. An item was designated as restart if it satisfied one or more of the following criteria:

- The item addressed a nuclear safety issue.
- The item addressed an operability issue.
- The item addressed design margin or conformance with the design basis.
- The item addressed issues requiring a license amendment under 10 CFR § 50.59 or nonconformances with the license or license conditions.
- The issue addressed restart licensing commitments and Confirmatory Action Letter issues.
- The item addressed an organizational, programmatic or process deficiency that could prevent maintenance of adequate design margins or conformance with a design basis.
- The item addressed significant equipment material condition deficiencies that could affect safety system availability, impact plant reliability, or reduce the ability of operators to operate the plant safely.

Implementation

The RSRB categorized the CRs identified during discovery and their associated corrective actions to designate those that needed to be completed prior to restart. Corrective actions classified as restart were planned as individual activities, or "binned" into Restart Implementation Action Plans to develop a comprehensive approach to managing numerous corrective actions of a similar nature. These corrective actions were structured to fix the physical plant (structures, systems and components), programs, processes and procedures, department functions, and management and oversight prior to restarting the plant.

Validation/Closure

The validation and closure process involved a planned and organized method to gather and validate the documented evidence to demonstrate that the planning, discovery and implementation activities for Davis-Besse IMC 0350 Restart List items have been properly completed or that post restart issues are understood and properly tracked to closure after restart.

Results

As a result of the implementation of the Restart Action Plan, approximately 16,300 CRs have been reviewed by the RSRB. Approximately 6,600 were designated as restart items. Almost all of the restart items have been completed, and the remaining restart items are scheduled for completion prior to restart.

NQA Assessments

NQA assessments concluded that the procedural criteria in NG-VP-00100, "Restart Action Plan Process," was appropriate and conservatively administered by the RSRB to ensure that work activities needed for restart were properly identified as such.

Conclusions

In summary, Davis-Besse is completing those items needed to support restart; the non-restart actions will not have an adverse impact on safety.

2. Restart Readiness Reviews

The Restart Readiness Review process is controlled by Davis-Besse Business Practice DBBP-VP-0002, which was established to ensure that the plant is ready to restart following the extended outage. This Business Practice is performed following major changes in plant conditions, such as entering Mode 4, startup following an extended outage, and fuel movement. It also establishes a detailed review process for areas not addressed by the Restart Test Plan and Davis-Besse restart procedures to ensure that the material condition, programs, processes and organization, including the organization's safety culture, are ready for restart and safe and reliable operation. The process includes a series of meetings of the combined leadership team, system engineers, and individuals responsible for IMC 0350 Checklist items. During these meetings the participants review the process and ensure that restart alignment is achieved.

This Business Practice review process is performed prior to entering modes 6, 4 and 2. Additionally, the safety culture assessment was performed prior to Mode 5 and again prior to the first Mode 4 (NOP Test and ascension to Modes 4 and 3). Attachment 1 to the Business Practice, "Restart Readiness Review Indicators," requires Section Managers and individuals responsible for IMC 0350 Checklist items to execute affirmations in which they confirm that they have reviewed approximately 20 indicators and concur that their section or IMC 0350 Checklist item is ready to support the mode change.

Plant walk-down inspections are required as a part of the process as well as affirmations from selected system engineers that their specific systems are ready to support a mode change. The Operations and Plant Engineering Managers select systems for review with concurrence from the Plant Manager.

Shift Managers are required to sign an "Operational Readiness Affirmation," indicating their concurrence that the plant is in a condition of material readiness to support safe and reliable startup (or mode change) and power operation. The Supervisor of Reactor Engineering is required to sign similar affirmations on core configuration and reactor startup.

The Safety Culture Assessment of DBBP-VP-0002 requires the Section Managers to affirm that their section's employees are ready to support the mode change based on a series of attributes for indicators under the Commitment Areas of Policy or Corporate Commitment, Plant Management Commitment and Individual Commitment. (This is described in more detail in Section V.A.2.)

At the completion of the review process, the SLT signs a recommendation to the site Vice President and FENOC Chief Operating Officer that the plant is ready to support a mode change.

In summary, the Restart Readiness Review process provides a final check that Davis-Besse systems, programs, and organizations are ready for restart. This process will be completed prior to restart.

I. <u>Reviews of Extent of Condition of 10 CFR § 50.9 Issues</u>

NRC Inspection Report 50-346/02-08 for Davis-Besse identified an apparent violation of 10 CFR § 50.9 involving two documents provided to the NRC that, based upon information that was available at the time, contained information that was not complete and accurate in all material respects. This inspection report also identified quality-related records required by 10 CFR 50, Appendix B, which contained inaccurate or incomplete information. To help ensure the completeness and accuracy of future records and submittals to the NRC, several actions have been taken, including issuance of a new policy stressing the need for complete and accurate information, providing training to personnel on the need for complete and accurate information, and issuing a new procedure governing validation, review, and approval of correspondence with the NRC.

To provide additional assurance that other documents provided to the NRC do not contain similar problems, the completeness and accuracy of a sample of prior NRC submittals was performed. This review was not part of the Return to Service Plan and was not designated as a restart action because the Return to Service Plan provided sufficient activities to ensure that the plant, programs, and organizations are sufficient to support safe and reliable restart and operation. The initial reviews of regulatory correspondence were conducted prior to restart to address NRC Restart Checklist item 3.i, “Process for Ensuring Completeness and Accuracy of Required Records and Submittals to the NRC.” The results of the reviews are summarized below.

<u>Results</u>

Initially, the reviews identified that six separate NRC submittals may have contained information that was not complete and accurate in all material respects as required by 10 CFR §50.9(a). Davis-Besse also determined that none of the potential inaccuracies or omissions were reportable to the NRC pursuant to 10 CFR § 50.9(b). In accordance with Davis-Besse administrative procedures, those six submittals that contained potential incomplete or inaccurate information were reported to the NRC in letters dated July 15, 2003 (letter Serial Number 1-1324), August 15, 2003 (letter Serial Number 1-1325) and September 15, 2003 (letter Serial Number 1-1328). Upon further evaluation under the Corrective Action Program, however, it was determined that of the six documents identified, only four of the documents contain information that may not be complete and accurate in all material respects.

One of these four incomplete or inaccurate documents involved the apparent deletion of potentially critical information from the “Apparent Cause of Occurrence” section of LER 97-004 prior to the submittal. This discovery prompted an expansion of the scope of the Completeness and Accuracy Review to include a more focused review of select submittals. This focused review involved a determination of whether any other potentially incomplete or inaccurate information may have been omitted or introduced during the development of submittals during the period of January 1996 to December 2000. The results of this focused review found several potential minor discrepancies, none of which is material or reportable under 10 CFR § 50.9(b).

Based upon the criteria established in the Completeness and Accuracy Project Plan, an expanded sample review will be performed consisting of 53 submittals dated between January 1996 and March 2002. Based on the conclusion that none of the issues identified to date by the reviews has significant implications for public health and safety or common defense and security, the expanded sample review will be performed post-restart and will be completed by March 31, 2004.

The Completeness and Accuracy Review involved the detailed scrutiny of over 2,200 statements of fact. Of those statements scrutinized, only a small number (about 0.2 per cent) were found to contain potentially material inaccuracies or omissions. Furthermore, none was found to have significant implications for public health and safety or common defense and security. These results indicate that there were no widespread noncompliances or programmatic concerns associated with the preparation, review, and submittal of NRC correspondence at Davis-Besse. Therefore, Davis-Besse concludes that the results of this review, in conjunction with the results of other activities under the Davis-Besse Return to Service Plan, provide reasonable assurance that the plant can be restarted and will operate: (1) without endangering the public health and safety or common defense and security; and (2) in compliance with applicable NRC regulations and requirements.

The NRC stated that it would close the associated Restart Checklist Item 3.i in Inspection Report 50-346/03-19.

J. Modifications, Program Improvements, and Management Actions to Improve Safety Margins

A number of actions were implemented to improve safety margins, including modifications to many SSCs, improvements to various plant programs, and changes to FENOC and Davis-Besse management.

1. Modifications

As discussed in more detail below, a number of modifications were implemented to recover and add safety margin, including modifications of the containment emergency sump and decay heat valve tank, refurbishment of the reactor coolant pumps and diesel air starting system, and installation of the FLÜS leakage monitoring system.

Emergency Sump

During the early stages of the current outage, it was discovered that the DHR system may not be able to maintain long-term recirculation flow because the suction screen for the containment emergency sump could become clogged by debris and because gaps in the screens could allow debris to pass through to the pump. This debris could be generated by steam blowdown during a loss-of-coolant accident (LOCA) or by containment washdown during containment spray mode. This condition was reported in LER 2002-005.

In response, several actions were taken, including removing materials from containment that could be the source of such debris (*e.g.*, unjacketed fibrous insulation and unqualified coatings) and revising the design of the emergency sump screen. This revised design included removal of the existing screen and installing a strainer assembly with significantly greater surface area. This modification expanded the screen surface area from 50 square feet to approximately 1,200 square feet of available area while decreasing the individual opening size and shape from approximately $^{1}/_{4}$ inch square openings ($^{5}/_{16}$ inches diagonal) to $^{3}/_{16}$ inch circular openings.

In summary, the design of the containment emergency sump has been improved through the implementation of substantial modification. This modification has placed Davis-Besse in the forefront of all PWRs in the United States in addressing generic issues related to containment sumps.

Decay Heat Valve Tank

The two in-series DHR suction isolation valves are housed in the decay heat valve tank and are normally closed during power operation to form the RCS pressure boundary. The valves are opened during shutdown operations to provide the normal cooling path from the RPV to the DHR pumps and heat exchangers. The two valves' motor operators are located below the LOCA containment flood height and are not watertight; consequently, they can not be relied upon to function if submerged. The decay heat valve tank is designed to prevent submersion of the motor operators until they have completed their safety function.

Historically, it has been difficult to obtain an adequate seal on the decay heat valve tank. A gel type (*e.g.*, RTV) sealing material has been used to seal known leakage areas around the steel plate that covers the decay heat valve tank. To improve performance, the sealant was removed and a steel plate liner was seal-welded within the decay heat valve pit. The decay heat valve tank design considered thermal expansion and contraction during submergence. Improved flood seals were also constructed for the three decay heat lines entering and exiting the compartment.

Reactor Coolant Pumps

Condition Report 02-03668 identified long-standing problems with RCP casing-to-cover joint leakage. To address this problem and other RCP issues, the following maintenance was performed on the four RCPs during the current outage:

- Replaced the casing-to-cover gaskets on RCPs 1-1 and 1-2;
- Replaced the rotating elements on RCPs 1-1 and 1-2;
- Installed new motors on RCPs 1-1 and 1-2; and
- Rebuilt and replaced the mechanical seals RCPs 1-1, 1-2, 2-1, and 2-2.

In addition, new Bentley-Nevada diagnostic equipment is installed on all four RCPs and is being tested. This equipment will allow for remote, real-time indication of pump vibration status and other relevant parameters in the Control Room and other selected locations in the plant.

Procedure NOP-ER-3001, "Problem Solving and Decision Making Process," was used to assess the condition of RCP 2-1 and 2-2 during the NOP test in September 2003. Results of that testing indicate that the case-to-cover gaskets have performed as designed and indicate that they are nearing the end of their operational life. Maintenance activities have been scheduled for the next refueling outage to replace the RCP 2-1 and 2-2 case-to-cover gaskets.

FLÜS Leak Monitoring System

In an effort to enhance the leak detection capabilities at Davis-Besse, a leak detection system, FLÜS, is being installed on the lower RPV head to monitor potential leakage of the incore instrumentation nozzles. This system (first of its kind in the United States) operates on the principle of humidity detection.

Permanent Reactor Cavity Seal Plate

A new permanent cavity seal plate (PCSP) was installed at Davis-Besse. Modification completion is pending testing in Mode 3. The PCSP is expected to reduce critical path time, radiation exposure, craft expense, and radwaste. Disposal of each access port O-ring is the only associated radwaste. Additionally, the PCSP should serve as protection for the RPV from the harmful effects of boric acid by controlling the flow from any potential leakage (during plant operation) from the RPV head flange or the control rod drive mechanism flanges.

Replacement of Coatings in Containment

Blistering and peeling of the containment dome top coat material was identified during visual examinations of the containment vessel surfaces during 12RFO and 13RFO. An examination performed during 13RFO found the degradation slightly more extensive than observed during 12RFO. A subsequent examination performed during 13RFO determined that the degradation was confined to the top coat material and that the primer coat material remained fully adhered to the substrate.

Engineering Work Request 01-0505 was initiated in December 2001 to remove the existing Phenoline 305 top coat material and re-coat it with Carboline 890. Per this EWR, existing Carboline Phenoline 305 top coat material was removed from the containment vessel dome area (above elevation 725'-0"), including appurtenances. New coating material was procured from an Appendix B supplier with supporting quality documentation.

In addition to the re-coating of the containment vessel dome, other significant coating work was performed during 13RFO. For example, it was determined that the CAC SW supply and return piping existing coating material was not design basis accident (DBA)-qualified and was degraded. The piping was re-coated with a DBA-qualified coating system.

It was also determined that both core flood tanks had been painted with a coating material for which no DBA qualification documentation could be located. The existing coating material was removed from both core flood tanks. The tanks were re-coated with a DBA-qualified coating system.

Davis-Besse was unable to verify that the RPV head service structure coatings applied during plant construction were DBA-qualified. Consequently, the coating material was deemed non-DBA qualified and subsequently removed. The RPV head service structure was re-coated with a DBA-qualified coating material.

It was also determined that the existing coating material applied to the CAC frames was DBA-qualified but degraded. CAC components were cleaned, prepared, and recoated with a DBA-qualified coating material, as appropriate.

Removal of Fibrous Insulation and other Debris from Containment

Significant resources were dedicated to reduce the debris sources within containment and significantly expand the sump strainer. Key aspects to reducing debris included significant efforts to upgrade coatings used in containment, as discussed previously. Additionally, steps were taken to minimize the amount of fibrous insulation in containment and the containment structure was steam cleaned to remove loose dirt and debris that had accumulated over the plant's operational lifetime. Tags and signs that could become debris were removed or replaced with materials that have demonstrated the ability to survive post-accident conditions. Procedures and specifications were put in place to ensure that the newly established conditions are maintained through the remainder of the plant life. Training of site personnel raised awareness of the need for maintaining containment cleanliness and methods used to maintain the standards.

Upgrade of Containment Cranes and Bridges

Both the polar crane and reactor service crane were upgraded. The controls and wiring for the polar crane were completely overhauled by the installation of new control boxes, wiring, electronics, and radio controls. The reactor service crane was refurbished by the addition of new wiring and electronic controls. The reactor service crane trolley, with a capacity of five tons, was replaced with a new unit able to lift seven tons.

Containment Air Cooler Modifications

The CACs were modified to correct damage from boric acid corrosion. Nearly the entire system was replaced including new CAC motors, plenum, cooling coils, and SW piping that supplies cooling water. To restore the system to its original design specification, the plenum was replaced with stainless steel, the coolers and drop-out registers were replaced. The use of stainless steel assures that boric acid corrosion will be minimized in the future, and the elimination of the galvanized steel previously used in construction of the CAC plenum and ductwork lowers the quantity of zinc in containment — a significant source of potential hydrogen generation. Finally, the service water piping that supplies the CACs was replaced to correct a prior design error.

Containment Vessel-to-Concrete Interface

Davis-Besse investigated the potential corrosion of the containment vessel. This investigation included the sampling and testing of the ingress ground water, corrosion products, and concrete on the exterior of the containment vessel. The investigation found no evidence of microbiological activity or chloride corrosion. The investigation determined that the observable corrosion above the vessel-concrete interface bounded the corrosion underneath the concrete, because of passivation of the steel vessel embedded in mass concrete. This investigation concluded that the containment vessel is acceptable for continued service.

Several modifications have been implemented to minimize the potential for future vessel corrosion and minimize the ingress of ground water at the vessel/concrete interface. These modifications included installation of a layer of non-shrink grout and a sealant to maximize the effective sealing at the vessel/concrete interface. In addition, the interior vessel-concrete interface was sealed to prevent water from collecting in the small gap between the two surfaces.

Cyclone Separators

Cyclone separators were added to the containment spray pumps' mechanical seal cooling water lines to protect the pumps' mechanical seals from debris during post-LOCA operation when the containment spray pumps take suction from the containment emergency sump. Addition of the cyclone separators to the pumps' seal cooling water supply lines reduces the potential for debris-induced mechanical seal failure, thereby increasing the plant safety margin. Moreover, the existing cyclone separators on the DH/LPI pumps were replaced with larger cyclone separators to provide more reliable debris removal from the mechanical seal cooling water supply to those pumps.

Emergency Diesel Generator Ventilation Modification

Two new modifications were implemented during 13RFO to reduce the EDG room temperatures. The first modification installed insulation on the EDG exhaust manifold, turbocharger, and flexible bellows. The second modification induced airflow through an EDG cabinet (static exciter voltage regulator). This modification was performed by drawing air from three areas of the cabinet through the EDG room ventilation fans. Post-modification test data is currently under review.

EDG Air Start System

Several deficiencies were identified in the EDG air start system, including rusting of the active components and discrepancies between the installed solenoid valves and those listed in the asset database. To address these deficiencies, selected portions of the carbon steel EDG air start system were replaced with stainless steel. The air start piping associated with the compressor was changed to stainless and air dryers were added. The carbon steel piping from the air receivers to the EDG air start motors was replaced with new carbon steel pipe.

Other Modifications

Other modifications have been implemented, including:

- Replaced numerous valves in the RCS;
- Environmentally qualified the pressurizer power-operated relief valve wiring to enhance plant safety;
- Upgraded auxiliary feedwater system; and
- Upgraded Appendix R Hot Shutdown Panels for operator indications of saturated conditions.

2. Program Improvements

As discussed in detail in Section IV.D, changes have been made to numerous plant programs, including the CAP and RCS Integrated Leakage Program. The CAP was extensively reviewed and significantly improved. In addition, the CARB has been strengthened and is chaired by a Director level position. Also, the categorization of CRs has also been strengthened.

The RCS Integrated Leakage Program is currently being revised to incorporate lessons learned during the sensitivity test and to incorporate the new algorithm into the existing RCS Water Inventory Balance Test. Once incorporated, the program will be able to identify small changes in the amount of unidentified leakage and trend this information.

3. Management Changes

As discussed in detail in Sections IV.D and V.A, a number of new management positions have been added to the FENOC corporate organization. These include the Chief Operating Officer, Senior Vice President – Engineering and Services, Vice President – Oversight, and several program owners. These new management positions will ensure that programs are consistently implemented at all three nuclear plants. A new management team has also been installed at Davis-Besse. The new managers have proven records, extensive nuclear experience, and many have or had senior reactor operator (SRO) licenses or certifications. In addition, Davis-Besse managers are now graded to the new leadership principles.

K. Conclusions

In summary, comprehensive Building Block Plans have been developed and implemented to replace the degraded RPV head, to determine whether other SSCs may have been adversely affected by PWSCC or boric acid corrosion, to verify that SSCs can perform their design basis functions and are in a condition sufficient to support safe and reliable operation, and to ensure that plant organizations and programs are fulfilling required obligations and are sufficient to support safe and reliable operation. As a result of implementation of these Plans, numerous conditions have been identified that require corrective action prior to restart. More than 7,400 restart corrective actions have been generated; more than 7,260 have been completed. As a result, Davis-Besse concludes that the organizations, programs, and SSCs are ready to support safe and reliable operation of Davis-Besse.

V. Management and Human Performance Improvements

Following discovery of the RPV head degradation in March 2002, several root cause investigations were performed to specifically identify the root and contributing causes of the failure to identify the corrosion of the RPV head. These analyses and other assessments identified a number of management and human performance-related deficiencies. In response, the Management and Human Performance Excellence Plan and the Management and Human Performance Improvement Plan were developed and implemented.

Section V.A below describes the actions that have been taken under each area of the Management and Human Performance Excellence Plan, and indicators of the effectiveness of those actions in each area. Section V.B below discusses the overall effectiveness of these actions, as determined by performance assessments during the NOP test in September 2003. Section V.C below describes additional actions taken based upon the results of those assessments.

A. Management and Human Performance Excellence Plan

The purpose of the Management and Human Performance Excellence Plan was to conduct a thorough assessment of the management and organizational issues surrounding the degradation of the RPV head and create a comprehensive leadership and organizational development plan for the site. The Plan consisted of three elements:

- Reviews and assessments as described in the Plan.
- Collective significance reviews.
- Specific actions to take before and after restart to ensure changes are effectively implemented.

This plan will drive long-term changes, with some actions required before restart, and others occurring after startup.

Using data from the root cause reports and other assessments associated with the RPV head degradation, it was determined that the primary management contributors to this failure could be categorized into the following five areas:

- Management/personnel development;
- Nuclear safety culture;
- Standards and decision-making;
- Oversight and assessments; and
- Programs/corrective action/procedure compliance.

The Management and Human Performance Improvement Plan was prepared and implemented to address each of these areas. The activities performed and improvements to date in each of these areas are summarized below.

In summary, FENOC has built an enduring organization rooted in and consistently aligned at all levels to the core values of safe and reliable operation of Davis-Besse. These actions anchor the improvements at Davis-Besse.

1. Improvements in Management/Personnel Development

Davis-Besse has the following objective for its management: *Managers are experienced, have high safety standards, and are involved in directing and overseeing plant activities.*

FENOC has appointed a new president and has created three executive positions (Chief Operating Officer, Vice President of Oversight, and Senior Vice President of Engineering and Services). The individuals who have been appointed to these positions are highly qualified and collectively have had substantial nuclear experience outside of the FENOC system. Additionally, corporate groups have been established to develop and monitor the implementation of common policies, standards, processes, and practices for all of FENOC's nuclear plants. These actions provide for strong corporate governance of FENOC's nuclear plants and independent oversight by Quality Assessment. This new corporate structure and the new officers are shown in Figure 4 on page 75.

The top two levels of management at Davis-Besse (site Vice President and plant directors) have been entirely replaced, as have almost all of the third level (managers). The new management team is largely drawn from outside of Davis-Besse, and includes several proven performers from plants outside of the FENOC system. Almost all of the new management has technical degrees and most have or have had senior operator licenses or certificates. These changes are shown in Figure 5 on pages 76 and 77.

In addition to improving its corporate and site management team, other actions have been taken to strengthen management, including:

- A common set of standards for management personnel has been established. The Davis-Besse Senior Management Team Standards, Leadership Strategies, and Basic Principles are posted in various locations at Davis-Besse. These standards stress the need for management to set and communicate the proper safety values and expectations for their personnel; to personally observe the performance of personnel to ensure that they are meeting expectations; to measure performance of personnel, systems, and programs within their areas of responsibility; and to take action to correct and prevent recurrence of performance problems. FENOC established new accountabilities for directors and managers, including Nuclear Professionalism and Nuclear Safety Consciousness, and the performance evaluation process.

- Evaluations have been performed of executives, directors and managers (and selected supervisors) to verify their competence for their current positions, including the adequacy of their nuclear safety focus.

- Leadership training has been implemented for the management team to set the standards for how the management team will be expected to conduct business.

- A Management Observation Program has been implemented, using the key attributes of the program at all three FENOC plants and benchmarked in the industry for best practices. The program was implemented at Davis-Besse in September 2002. Examples of attributes that are assessed include: pre- and post-job briefs; safety observations; radiation safety; field observations; office observations; and foreign material exclusion observations. Data from these attributes are used to assess overall station performance. Many management observations are planned and scheduled in advance. Scheduled management observations focus on important safety-related work.

- Standards and Expectations were issued for the Duty Team, which includes a director and managers who are responsible for maintaining cognizance of plant conditions during their duty week. These standards and expectations include performing tours during off-normal hours, chairing plant status meetings, and maintaining a four-hour presence during each weekend day and holiday.

- In January 2003, a memorandum was issued to Shift Managers at all three FENOC stations, specifying their command responsibilities. These responsibilities include maintaining the highest safety consciousness, awareness and understanding of risk associated with plant activities; making decisions that are conservative to safety; raising safety issues and fostering an environment where people feel free to raise concerns; and being involved with important plant activities. This memorandum also specifies their responsibilities for managing abnormal or emergency conditions.

Figure 4 -- New FENOC Corporate Structure

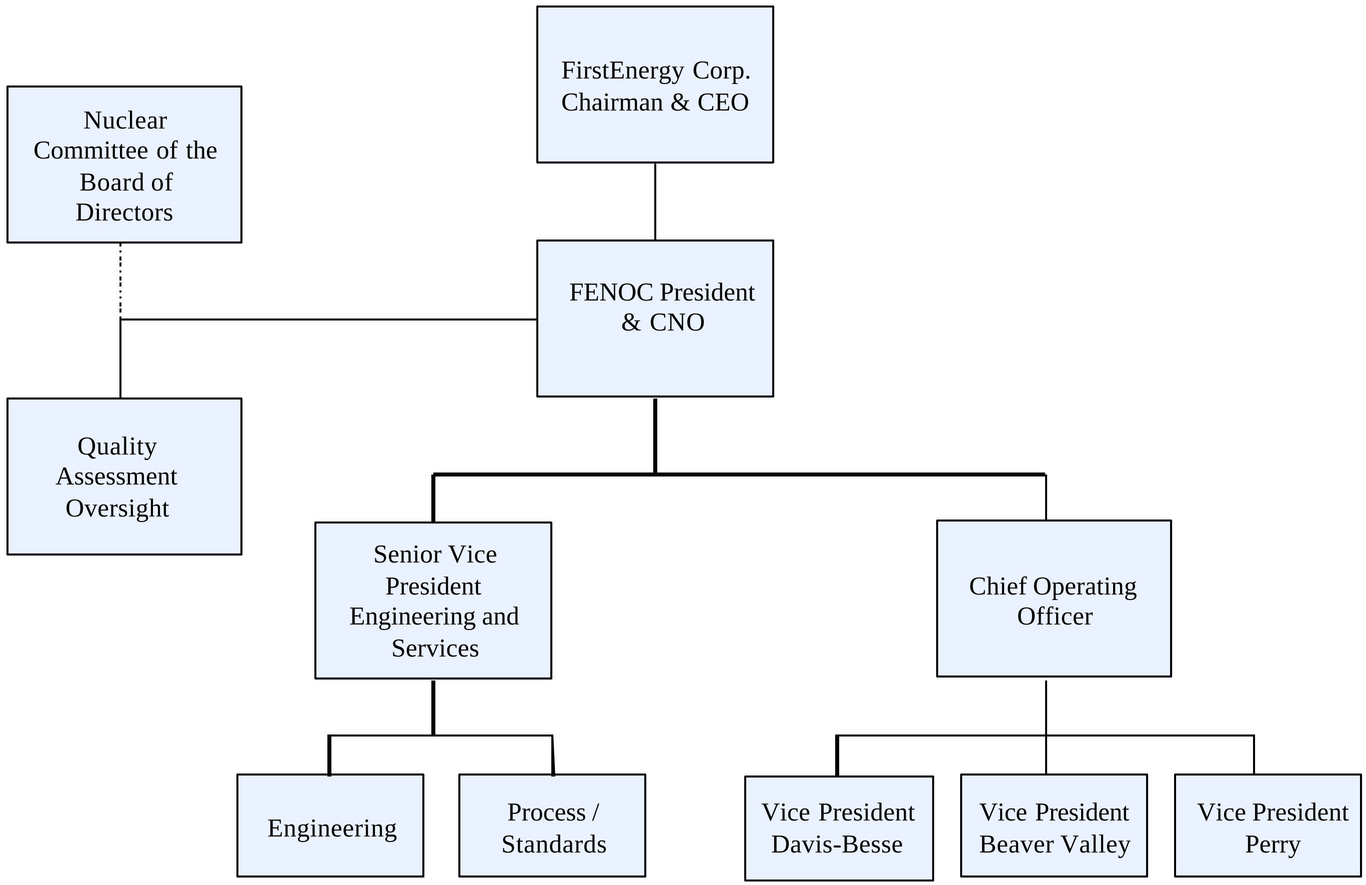
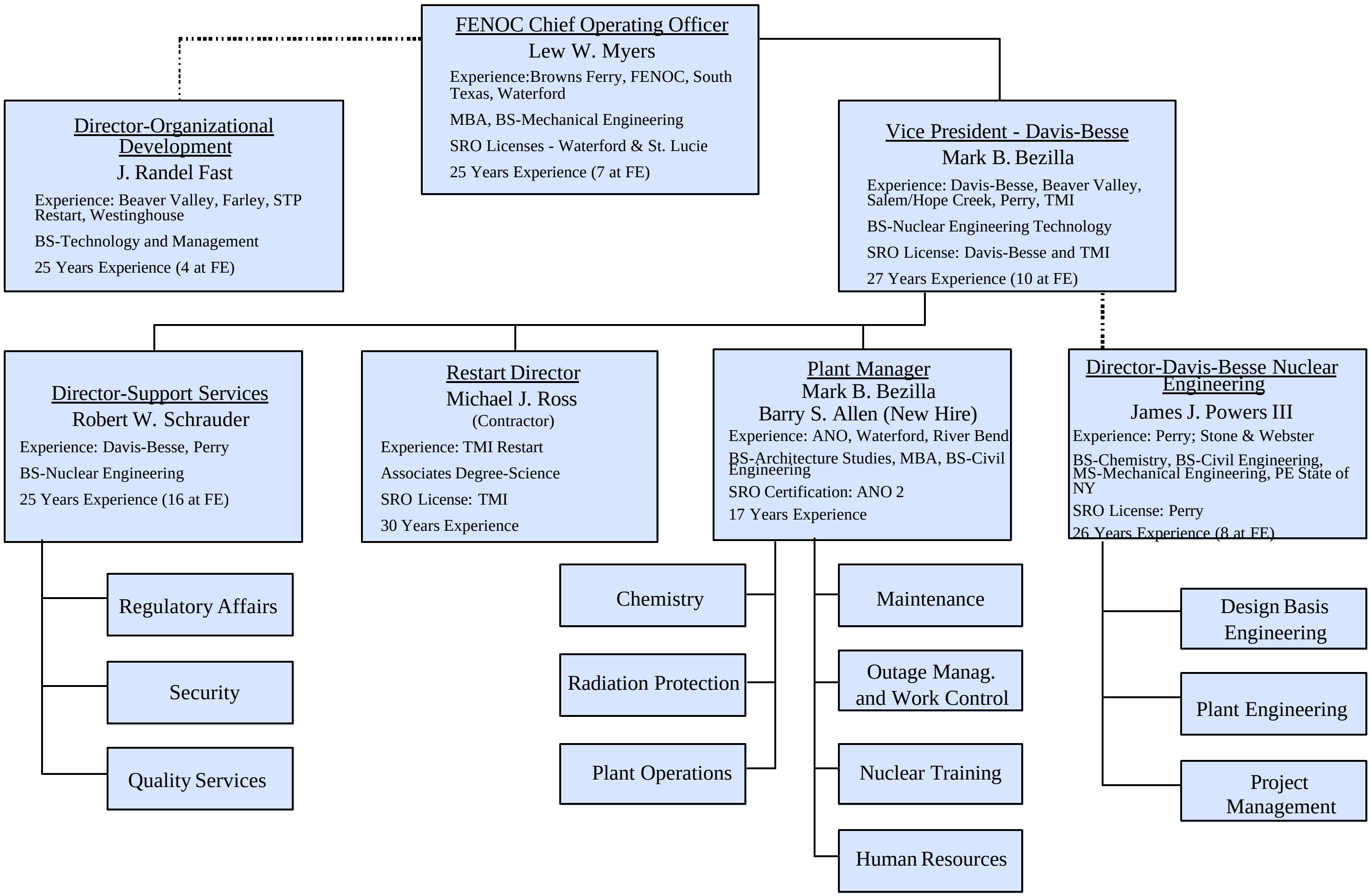
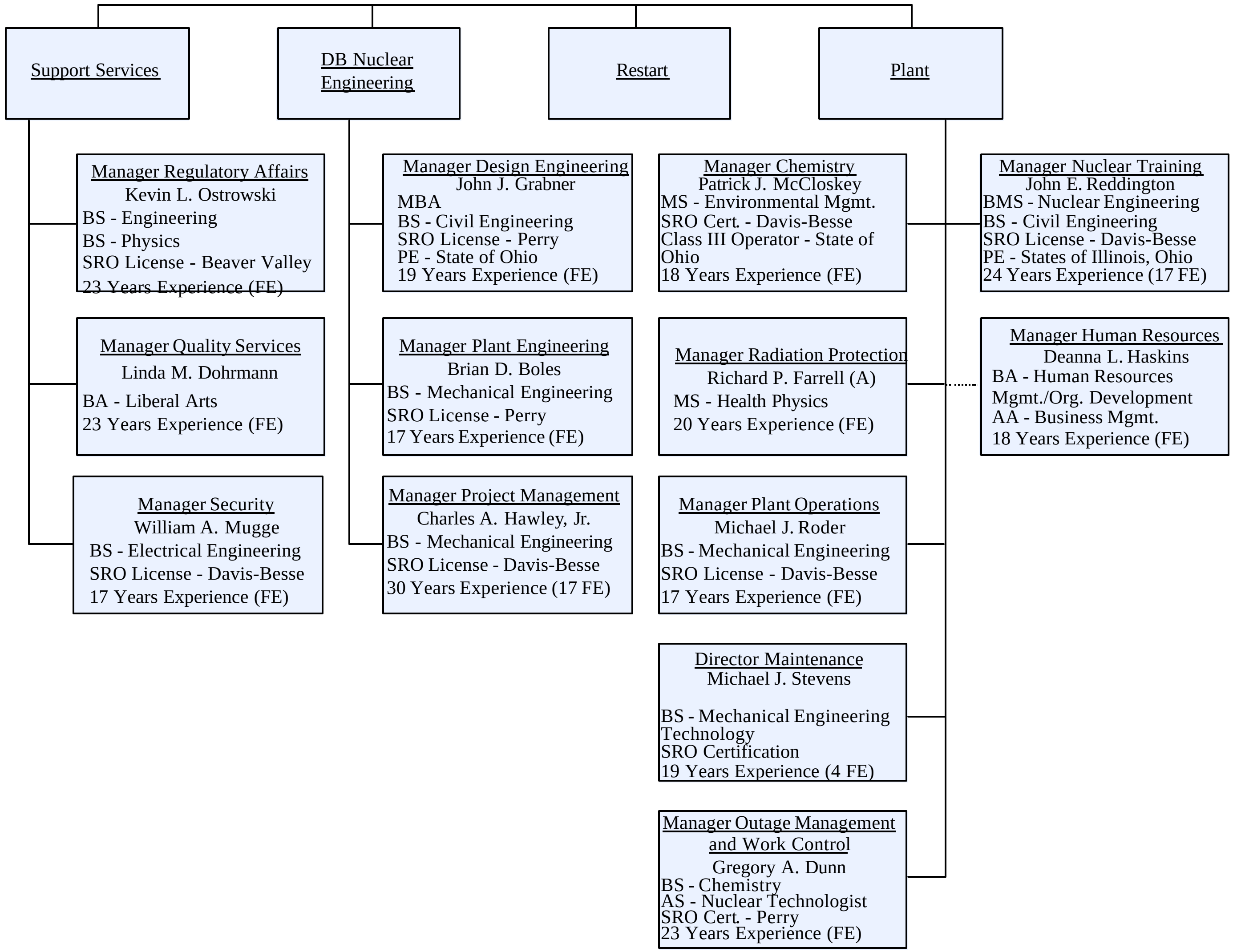


Figure 5 -- Davis-Besse Senior Leadership Team



This figure depicts the restart organization; Davis-Besse is transitioning to an operating organization.

Figure 5 -- Davis-Besse Senior Leadership Team



Results

As discussed in later sections of this report, various performance indicators and assessments at Davis-Besse show improved performance, reflecting upon effectiveness of the new management team. Additionally, Davis-Besse management is currently meeting its goal of completing at least 90 percent of scheduled management observations.

The actions of the new FENOC and Davis-Besse management team also demonstrate that they have high safety standards and are involved in directing and overseeing plant activities. For example:

- Adding Safety Margin – As discussed in Section IV.J, management has initiated modifications to add safety margins beyond those necessary to ensure operability of systems and components.

- State-of-the-Art Programs and Systems – Management has taken a number of actions to create state-of-the-art programs and systems at Davis-Besse, including the FLÜS leakage detection system, RCS Integrated Leakage Detection Program, Problem Solving and Decision-Making process, Management Observation Program, Safety Culture Assessment process, and modification of the containment vessel emergency sump.

- Strong Use of the Corrective Action Program – Management reinforced its expectations and shared the lessons learned from the CAP review and the NRC CAP inspection through a series of stand-downs for employees. The importance of using the CAP was consistently reinforced in communications and meetings focused on ensuring a Safety Conscious Work Environment. To ensure CAP implementation would improve, individuals with key responsibilities in CAP were trained to the higher standards and expectations. Section-level ownership and oversight was improved through the assignment of CR Analysts. Quality intrusive management oversight was implemented through mandatory CARB review of apparent and root cause evaluations. These actions have resulted in consistently high CR generation and improved evaluations and corrective actions.

- Conservative Approach to Safety Using Decision-Making Nuclear Operating Procedure – Management has taken a conservative approach to problem solving. For example, a complete inspection was performed of fuel for damage after finding some damage to a fuel assembly, and the reactor core internals were removed to inspect for debris in the reactor vessel. Additionally, an improved model, Electrical Transient Analysis Program (ETAP), is used to evaluate the adequacy of electrical systems rather than relying upon an older, less effective model previously used at Davis-Besse.

- Stand-Downs and Stopping Work – To ensure that work is performed properly and that personnel understand the need for the proper safety focus, management has initiated a number of stand-downs and stop work orders, including a stop work on the containment polar crane when some problems were identified in

September 2002, a stop work on a contractor on rebar cadwelding in the fall of 2002, and a stop work on fuel movement when spacer grid damage was observed in 2002. Davis-Besse also has imposed stand-downs, including a stand-down on Radiation Protection when proper RP practices were not followed, and a stand-down on Maintenance to emphasis the need for procedure compliance. Similarly, during the NOP test in September 2003, plant evolutions were halted when issues arose during plant heat-up and cool-down, thereby demonstrating the proper safety focus.

In summary, the Davis-Besse management team has been changed out and significantly strengthened, including the addition of enhanced corporate oversight. The new management team has demonstrated by its actions that it has high safety standards and is involved in directing and overseeing plant activities. FENOC has built an enduring organization rooted in and consistently aligned at all levels to the core values of safe and reliable operation of Davis-Besse. Employees constantly receive reinforcement of these core values and senior management is selected based on a fit with these core values. Therefore, Davis-Besse concludes that it is ready for restart in this area.

2. <u>Improvements in Safety Culture</u>

Safety culture is defined at Davis-Besse as "that assembly of characteristics and attitudes in organizations and individuals which establishes an overriding priority towards nuclear safety activities and ensures that issues receive the attention warranted by their significance."

As discussed in this section, safety culture has significantly improved at Davis-Besse during the current outage. Also, management is placing additional emphasis upon issues involving safety-related activities. Nonetheless, Davis-Besse is continuing to pursue improvements in all areas as discussed in the Operational Improvement Plan for Cycle 14.

Davis-Besse has the following objective for safety culture: *Nuclear, industrial, radiological and environmental safety have the highest priority and take precedence over other objectives, such as cost and production. Personnel feel free to raise safety concerns without fear of retaliation, and concerns are investigated and resolved in a timely manner.*

Actions to achieve this objective have included the following:

- The FirstEnergy Board of Directors issued a resolution to communicate from the highest level the significance of nuclear safety.

- The Chief Executive Officer of FirstEnergy has met with Davis-Besse personnel to express his policy that safe nuclear operations require an unrelenting and uncompromising commitment to safety, and that the highest levels of productivity are meaningless if they're not achieved with a strong focus on safety. Additionally, he met with the shift managers one-on-one to ensure that his expectations are satisfied and that the roles and the responsibilities of the shift managers are clear.

- A policy was established that incorporates FENOC's objective on safety culture.

- The existing Leadership in Action training of management was revised to include training on the need for a nuclear safety focus.

- Management incentives were realigned to place the most weight on safety and safe operation.

- Management has communicated standards of excellence at all levels. Multiple forums have been used to communicate high standards and obtain feedback from personnel. For example, until preparations for entering Mode 4 began in August 2003, town hall meetings and 4-Cs meetings were held weekly, and there were monthly Davis-Besse Team meetings. (Pursuant to the Operational Improvement Plan and Business Practices DBBP-VP-0003, -0004, and -0005, these meetings will continue post restart.)

    - The town hall meetings have included a presentation on recent developments and planned activities.

    - The 4-Cs meetings have been conducted by FENOC's Chief Operating Officer (COO) and provided small groups of employees with an open forum to express "compliments, concerns, changes and communications."

    - Management has held monthly all-site meetings with personnel to provide a picture of recent developments and upcoming activities.

- Case Study training was given to site personnel to ensure that they understand how the RPV head degradation event happened, what barriers broke down, and what needs to be different in the future. This study is now also given to new hires.

- A process has been established to monitor safety culture at Davis-Besse.

- FENOC has issued a policy statement on SCWE, which emphasizes the importance of raising safety concerns and states that retaliation against individuals who raise safety concerns will not be tolerated. Managers and supervisors have received training on SCWE. Recent surveys indicate an improvement in employee willingness to raise issues of safety and quality to management.

- A new ECP has been established, which falls under the responsibility of the President of FENOC and his direct reports. The ECP includes independent investigators and provisions for submitting anonymous concerns and maintaining the confidentiality of those concerns. Information on the new ECP has been and continues to be widely disseminated in the OnLine newsletter to site personnel, in meetings with personnel, and in posters around the site.

- A SCWE Review Team has been established, consisting of plant directors and representatives from the ECP, Human Resources, and Legal, to evaluate proposed significant adverse actions against employees before the action is taken to help detect and prevent the potential for or perception of retaliation for raising safety concerns.

- An independent consultant, Performance, Safety and Health Associates (PSHA), performed an evaluation of the Davis-Besse safety culture and management is responding to the issues identified.

<u>Results of Assessments in Early 2003</u>

The PSHA assessment, "Safety Culture Evaluation of the Davis-Besse Nuclear Power Station," was issued in April 2003, and found several areas warranting improvement, including:

- Although safety is a recognized value in the organization, PSHA found that it was inconsistently accepted and understood across all levels of personnel. Problems were found to exist in the transmission, comprehension, and implementation of the safety message.

- PSHA found that accountability and ownership for safety were not universally accepted in the organization. Although some individuals readily accept responsibility and take ownership of problems, PSHA found that others were still reluctant to do so.

- PSHA found that safety was not consistently integrated into all activities in the organization. Processes and programs were found to be in various stages of transition, which often reduced their effectiveness.

- PSHA found that there was no integrated and cohesive organizational safety leadership process. The values and attitudes of the workforce are generally positive, but many differences were found between work groups, and between management and staff, indicating that personnel were not yet aligned with a common set of values. PSHA found that management's safety goals were not consistently communicated to nor understood by station personnel.

- PSHA found that safety was not learning-driven in the organization. PSHA found that efforts to improve future performance by learning from the plant's past performance, from others' performance, and from the day-to-day implementation of the organization's programs and processes, were not systematic or recognized to be of high value for the organization.

Davis-Besse's own assessments found similar concerns in early 2003. For example, the March 2003 SCWE Survey Results showed that there was a continuing opportunity for site-wide improvement in areas of management internalization and espousal of "Basic Principles" in dealing with workers, management reinforcement of safety over cost and schedule, and rigorous follow-through on CAP improvements. It also found that there was a continuing opportunity for site-wide management reinforcement of SCWE with contractors, and that significant "challenge pockets" existed in areas of RP/Chemistry, Maintenance, and Plant Engineering for both site and contractor workers. Similarly, "Davis-Besse Nuclear Quality Assessment Quarterly Assessment Report DB-C-03-01 for January 1 to April 21, 2003," identified that approximately 20 percent of personnel interviewed believed that identified concerns had not been effectively resolved, and that approximately 10 percent said they were aware of instances over the last three months in which another individual was retaliated against for raising an issue.

At the time that these assessments were conducted (*i.e.*, the first quarter of 2003), many of the improvements had not been implemented or had been in effect for only a short period of time.

<u>Additional Actions to Improve Safety Culture</u>

In response to these assessments, additional actions were taken to improve performance. These actions included:

- <u>New Vision and Strategic Objectives</u> – In July 2003, FENOC's Executive Leadership Team established a new vision for its fleet of nuclear plants. The new vision is "*People with a strong safety focus delivering top fleet operating performance*." To help achieve this vision, the team identified four (later expanded to five) strategic objectives and a set of metrics to track success in achieving the objectives. These strategic objectives and metrics are discussed in more detail in Section VI.A.

- Training has been provided to personnel on the requirements of 10 CFR § 50.7 and 50.9:

  - Training on Completeness and Accuracy of Information (lesson FEN-50.9M), which covers the associated legal and FENOC policy requirements, was completed for Davis-Besse supervisors and above by July 30, 2003. Subsequently, each section conducted training for employees and contractors who might create records or provide information to the NRC. The majority of site-assigned individuals completed this training (lesson FEN-50.9E) by August 30, 2003. The FENOC Integrated Tracking System training database is tracking the individuals who have not completed this training.

  - Beginning September 1, 2003, the objectives of the training course FEN-50.9M and FEN-50.9E are covered by the FENOC employee orientation manual (FEN-EOM). This training consists of required reading and review of the lesson materials for FEN-50.9 followed by an evaluative check-out by a member of their management/supervision to ensure the objectives are met for new FENOC employees.

  - SCWE training (10 CFR § 50.7) was conducted for supervisors and above as required training. Beginning on September 1, 2003, this training requirement is also addressed by the FENOC employee orientation manual, FEN-EOM, in a manner similar to 10 CFR § 50.9 training described above. New FENOC employees receive Sections 50.7 and 50.9 training when hired; supervisors receive both of these topics again as part of their supervisor training curriculum. Going forward, these two topics are anchored in FEN-EOM and supervisor training.

- Restart Readiness Review Safety Culture Assessments – Business Practice DBBP-VP-0002 was used prior to Modes 5, 4a, and 4b/2 to assess the safety culture readiness for mode changes.

- Performance Indicators – Section-specific performance indicators have been developed. Indicators have shadow-boxes to display section/department/site performance in a color format to enhance the visibility of those areas needing attention. The indicators are displayed in several locations on site.

- Daily Condition Report Meetings – Daily meetings are held to provide management oversight of Condition Reports and Corrective Actions coming due. Extensions and deferrals require management cognizance. Additionally, CRs are reviewed for mode restraints, operating experience, and good catches.

- Enhancements in the Management Observation Program – The Management Observation Program was enhanced by having the program owner and management sponsor monitor the results of the program and provide feedback for further action. Similarly, the managers for Operations and Maintenance discuss relevant observations on a routine basis. For example, areas in which weaknesses are observed become focus areas for further observations and are highlighted to the cognizant managers to enable them to take action to improve performance. Additionally, in July 2003, a three-day training session on management observations was provided to Training Instructors (now called Performance Consultants). In addition to classroom training, training includes paired observations in the field with line management to share their knowledge and provide job training on conducting and documenting observations by line management. Periodically, either requalification or refresher training will be conducted for management observations.

- Director of Organizational Development – In May 2003, a new department and position, Director of Organizational Development, was created to focus on achievement of continuous improvement in safety culture and SCWE. At the beginning of September, this position was changed to a FENOC corporate position to ensure alignment and improved safety culture throughout the organization.

- Stabilizing the Organization – Various open positions at individual, supervisor, and manager level have been filled. Additionally, a permanent Vice President and Plant Manager for the station have been appointed.

- Project Review Committee (PRC) – The PRC has been revised to provide for the involvement of executive and senior management to ensure that safety significant modifications receive appropriate resources and are scheduled for completion in a timely manner.

- Personnel Evaluations – Davis-Besse completed a personnel evaluation of non-union employees. This was performed after the first quarter 2003 safety culture assessments were largely completed.

- Performance Consultants – Training personnel have been trained to become performance consultants. The performance consultants observe performance in the field and review various indicators (such as condition report trends, rework items, and QA trends) to proactively search for performance weaknesses and work with station personnel to identify methods for achieving improvements in performance.

- Corrective Action Program – As discussed in Section IV.D.2, the CAP was significantly revised in March 2003.

- Safety Conscious Work Environment – Meetings were held with personnel in the RP/Chemistry, Maintenance, and Plant Engineering groups in the summer of 2003, emphasizing the importance of SCWE, including the willingness to listen and respond to worker concerns and criticisms.

- Root Learning – Davis-Besse personnel were trained using Edventures Learning Tools to ensure alignment of the organization for restart and specific focus on safety culture. Nine training sessions were conducted to ensure that personnel on both day and night shift received the training. The Edventures session was an eight-hour interactive program for employees, in groups of eight to 10, led by a trained employee facilitator. The focus was on the future and the key role each employee must play to guarantee the organization is built to last and that the organization can safely move forward. Employees were guided on their responsibilities to the company, nuclear community, and the public as the station moves forward. Senior Management played a key role in each session with an informal discussion on current plant status as well as a wrap-up discussion of the restart schedule.

Results of Additional Actions

These actions have been effective in improving the safety culture at Davis-Besse, as shown by various assessments and surveys. For example, Business Practice DBBP-VP-0002, "Restart Readiness Review Extended Plant Outage," was issued to establish a safety culture model and to assess safety culture prior to entering various plant operating modes. The safety culture model is patterned after and expands upon the model provided in International Atomic Energy Agency (IAEA) Safety Series INSAG-4. In accordance with the model, safety culture is assessed in three areas: Policy Level Commitment, Managers' Commitment, and Individuals' Commitment. Within each of these areas, performance is assessed with respect to five or more criteria. In turn, performance for each criterion is assessed with respect to a number of different attributes, with specified (largely objective) acceptance criteria. Based upon the assessments, performance for each attribute, criterion, and commitment area is given a color rating: "Green" (acceptable with a few minor deviations), "White" (acceptable with a few attributes/indicators requiring management attention), "Yellow" (acceptable with several attributes/indicators requiring prompt management attention), or "Red" (several attributes/indicators do not meet acceptable standards). The Business Practice states that restart is not permitted if any of the commitment areas is Red.

Over time, the Business Practice has been revised to make the acceptance criteria more restrictive. In accordance with the revision then in effect, safety culture assessments were conducted prior to entering Mode 5 (March 2003) and the first Mode 4 (July 2003); an additional assessment was performed in November 2003 in preparation for the Mode 4b/2. The results of the assessments are depicted on Figures 6, 7, and 8, respectively on pages 87 - 89.

The Readiness Review Safety Culture Assessment performed for Mode 5 concluded that all three of the safety culture commitment areas should be characterized as Yellow (all major areas are acceptable, with several criteria requiring prompt management attention). The Assessment performed for first Mode 4 showed substantial improvement. In particular, the Policy/Corporate and Individual commitment levels had improved from Yellow to White. The Assessment for Mode 4b/2 showed even further improvement, with all commitment levels rated White. Furthermore, there was also substantial improvement at the criteria level. For example, from the Mode 4 assessment to the Mode 4b/2 assessment, five of the criteria improved (while two worsened, in part due to the more stringent acceptance criteria). Furthermore, unlike the early assessments, none of the criteria was rated as Red as a result of the Mode 4b/2 assessment. These improvements are especially noteworthy given the more stringent acceptance criteria that were applied in the later two assessments (and especially the assessment performed in November 2003 for Mode 4b/2). The improvement is largely attributable to the fact that many of the actions needed for an improved safety culture have been completed, that backlogs have been reduced, and that performance itself has improved.

Although the Safety Culture Assessments showed improvement, there were several criteria for the Mode 4b/2 assessment that were rated as Yellow. As described below, however, these results do not indicate that Davis-Besse is unsafe to restart.

- "Commitment to Safety" was rated as Yellow, largely due to the events and assessments during the Normal Operating Pressure test in September 2003. Those events and assessments, and Davis-Besse's corrective actions, are discussed in more detail in Sections V.B and V.C.

- "Commitment to Continuous Improvement" was rated as Yellow for several reasons:

    - There are 28 open requisitions for exempt-employee positions. Pending hiring of permanent employees for these positions, Davis-Besse is using contractors to complete work activities.

    - There were a number of operator workarounds and control room deficiencies. The restart schedule, however, includes activities to reduce these numbers to the White or Green level.

- The effectiveness of Safety Conscious Work Environment Review Team in avoiding discrimination complaints was rated Red because of the number of such complaints submitted to the NRC during the past year. Most of these complaints, however, were submitted late last year or early this year. Since April 2003, the rate of discrimination complaints is less than half of the rate for 2002 and the first quarter of 2003 (though the rate is still higher than desirable).

- The "Drive for Excellence" was rated as Yellow because of the number operator workarounds, control room deficiencies, and Maintenance Rule Section (a)(1) systems. The restart schedule, however, includes activities to work these numbers down to the White or Green level. Additionally, during the previous quarter, there were a number of Condition Report evaluations that were not completed on schedule according to the CREST-established due date (though in many cases management consciously approved extensions of those due dates). This was largely a reflection of the backlog of Condition Reports that Davis-Besse is working down, and not a reflection of the quality or safety focus of organization.

In summary, while several criteria were rated Yellow during the Mode 4b/2 assessment, the overall ratings indicate that Davis-Besse is safe to restart.

Figure 6 -- Results of Safety Culture Assessment for Mode 5

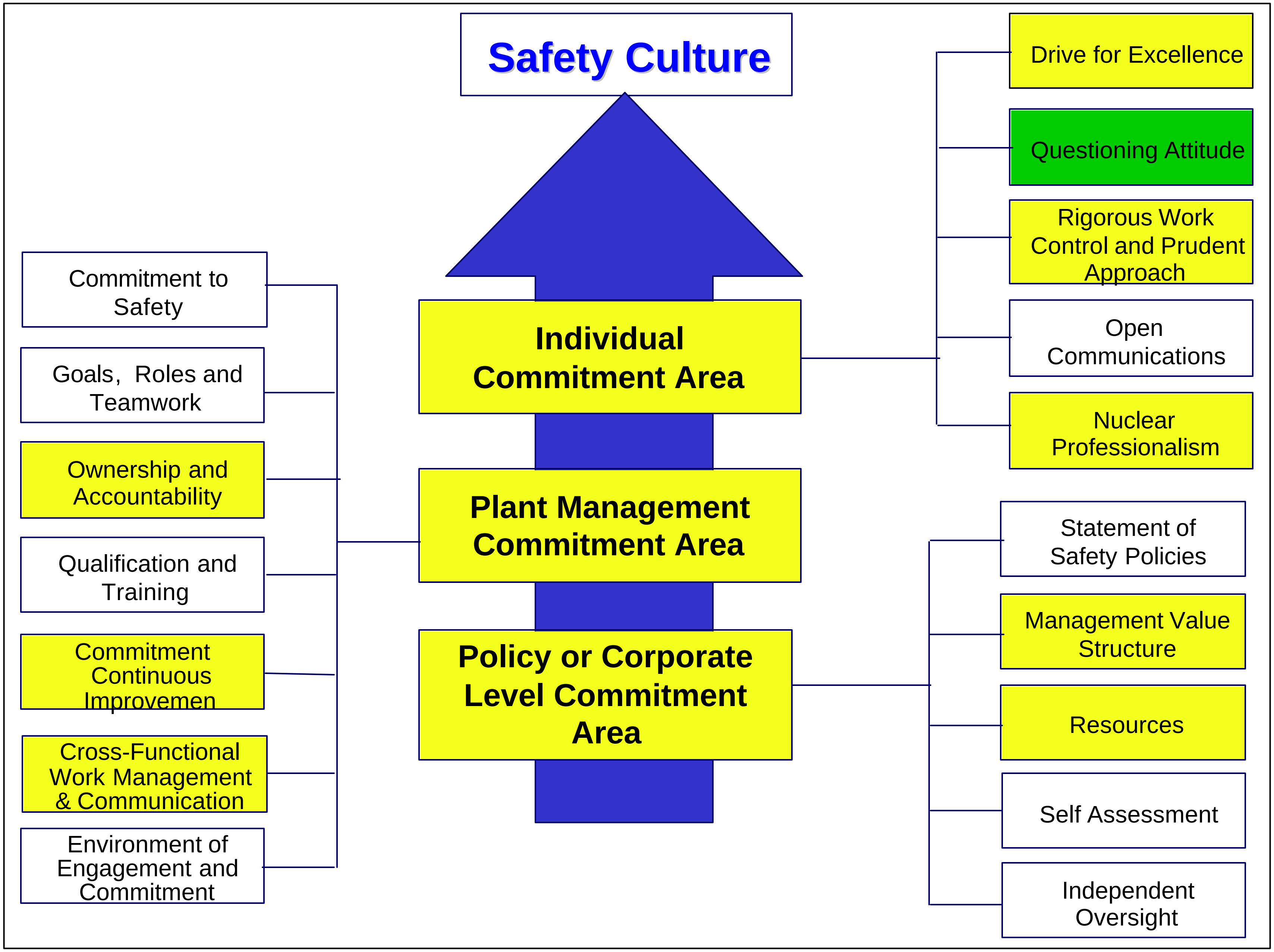


Figure 7 -- Results of Safety Culture Assessment for Mode 4

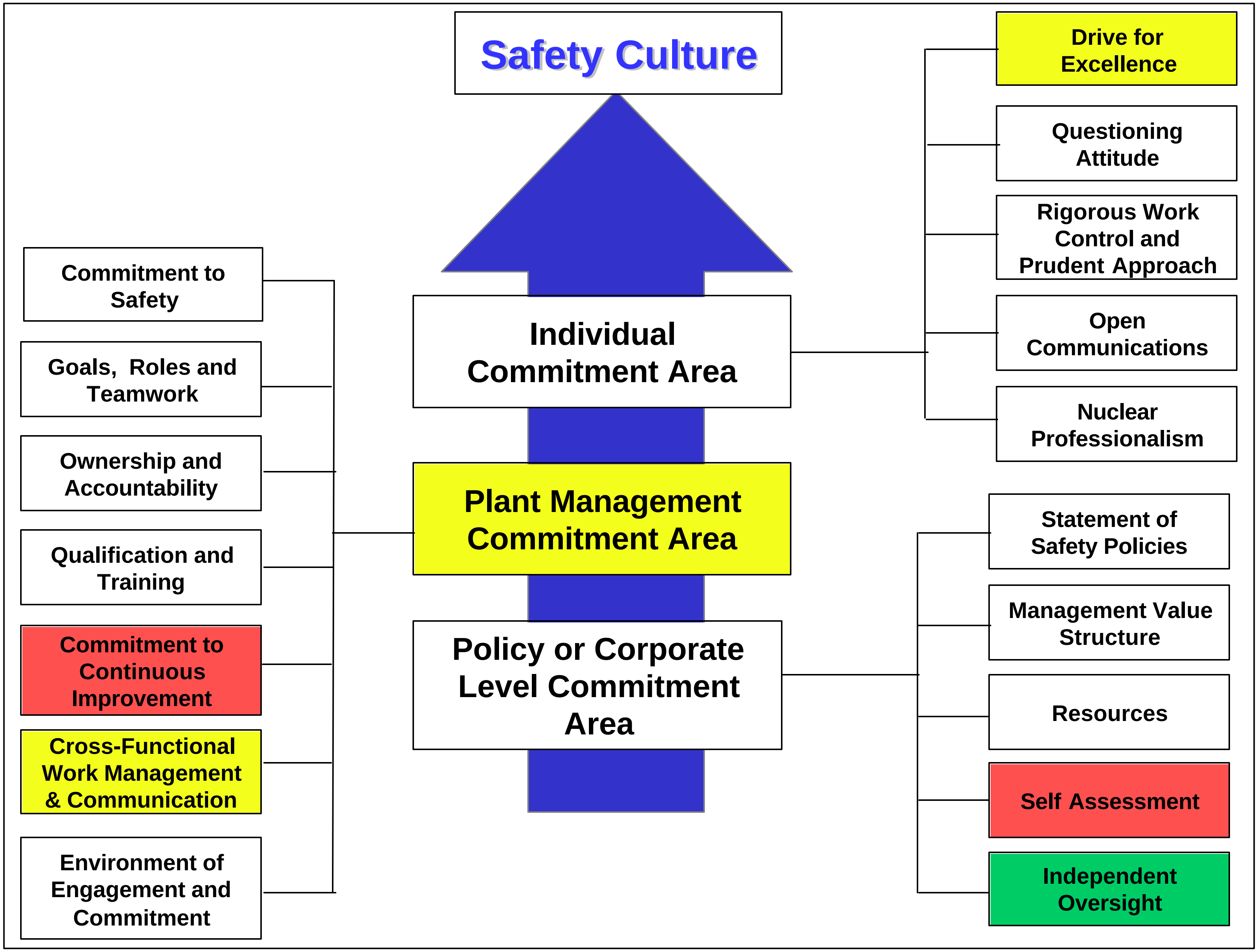
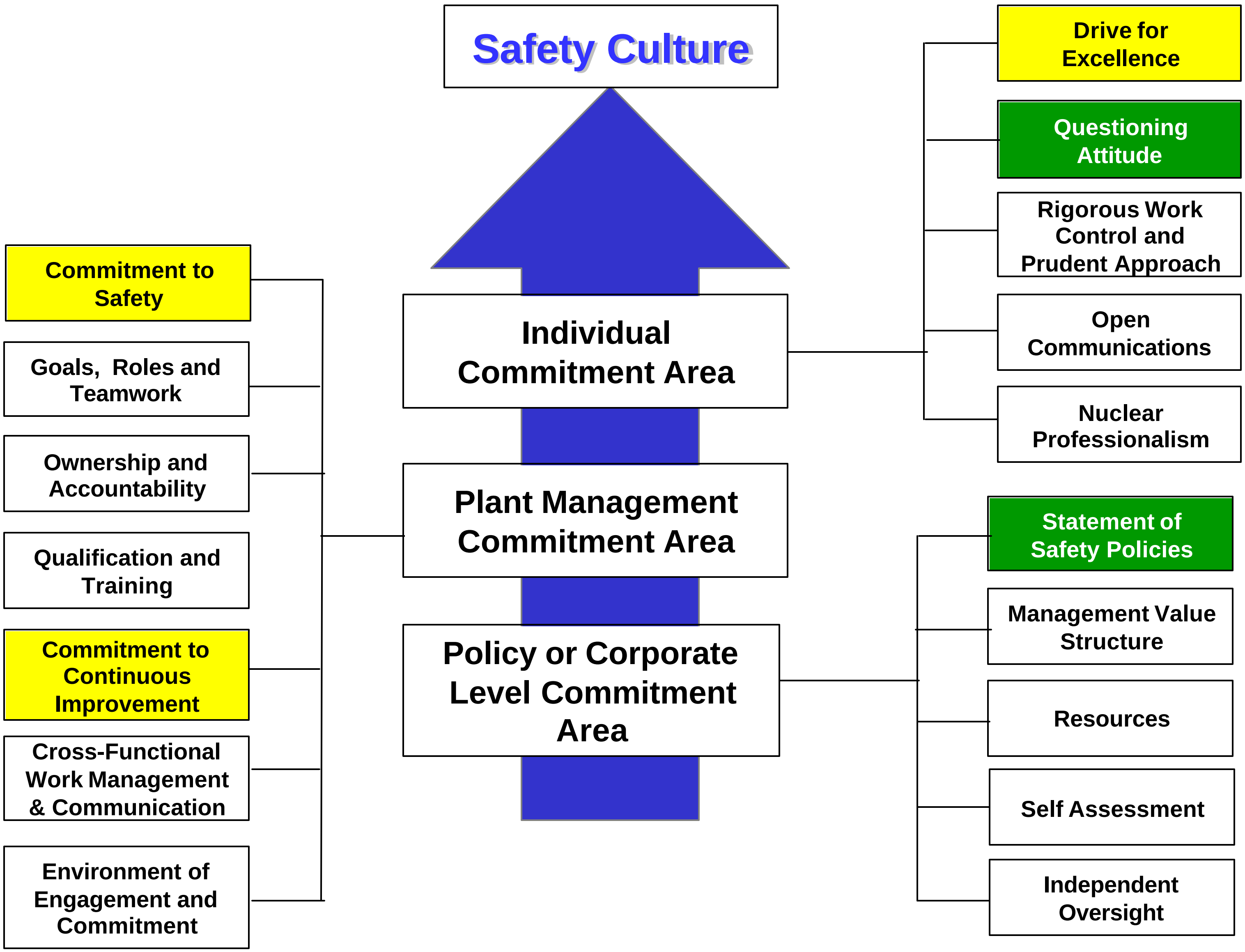


Figure 8 -- Results of Safety Culture Assessment for the Mode 4b/2

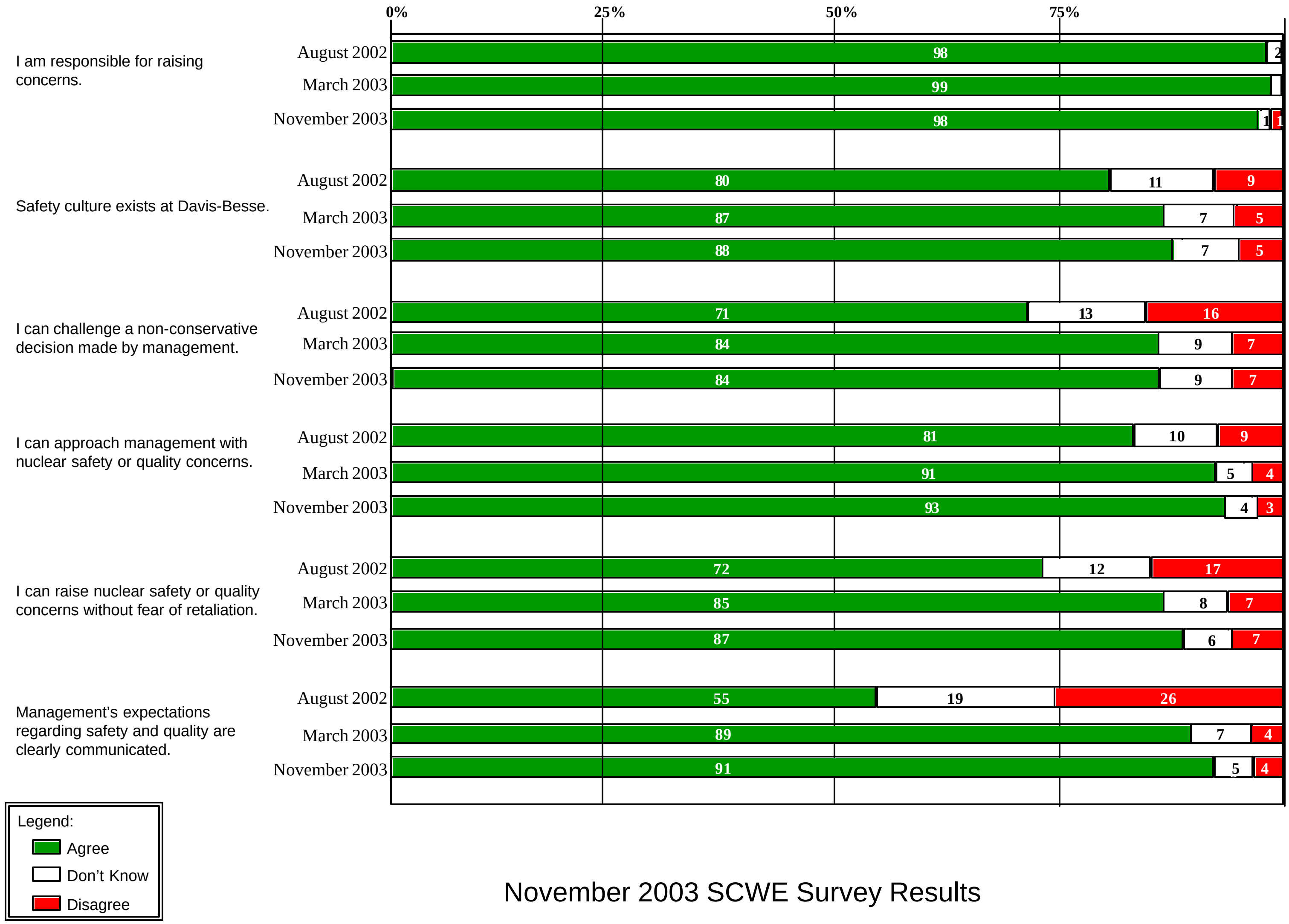


During the current outage, three SCWE surveys have been conducted: one in August 2002, one in March 2003, and one in November 2003. As shown in Table 1 on pages 91 - 96, the survey in November 2003 showed substantial improvement in almost every category relative to the results from August 2002. In particular, the results from the November 2003 SCWE Survey showed substantial improvement on 24 of 25 questions (with the results of the remaining question being about the same) relative to the August 2002 SCWE Survey. Furthermore, the results from the November 2003 SCWE Survey in general showed improvement relative to the results from the March 2003 SCWE Survey (with improvement on more than half of the questions, with the results of the other questions being the same ± 2 percentage points). Thus, the results of the three SCWE Surveys show continuous improvement over time. Furthermore, the absolute numbers from the November 2003 SCWE Survey are favorable, with positive responses outnumbering negative responses by a factor of at least 10 to 1 on all but five questions.

In addition to the results of the SCWE Survey of most site personnel in November 2003, NQA conducted interviews of a smaller population (approximately 10 percent of the site population of 841 employees) in November 2003 to determine their perceptions of safety culture and SCWE. The results of the NQA interviews are presented in Table 2 on pages 97 and 98. For a few questions, the results of the NQA interviews showed a decrease relative to early interviews in February (*e.g.*, there was a decrease in the percent of employees who reported that the proper effort is being placed on corrective action). The results of the November NQA interviews and SCWE Survey, however, still correlated well in this area (in both cases, about 75 percent of the personnel reported that timely and effective corrective action is being taken). Furthermore, in general, the results on questions from the NQA assessment in November 2003 were similar to the results on comparable questions from the SCWE Survey in November 2003. Overall, the results of the NQA interviews were positive.

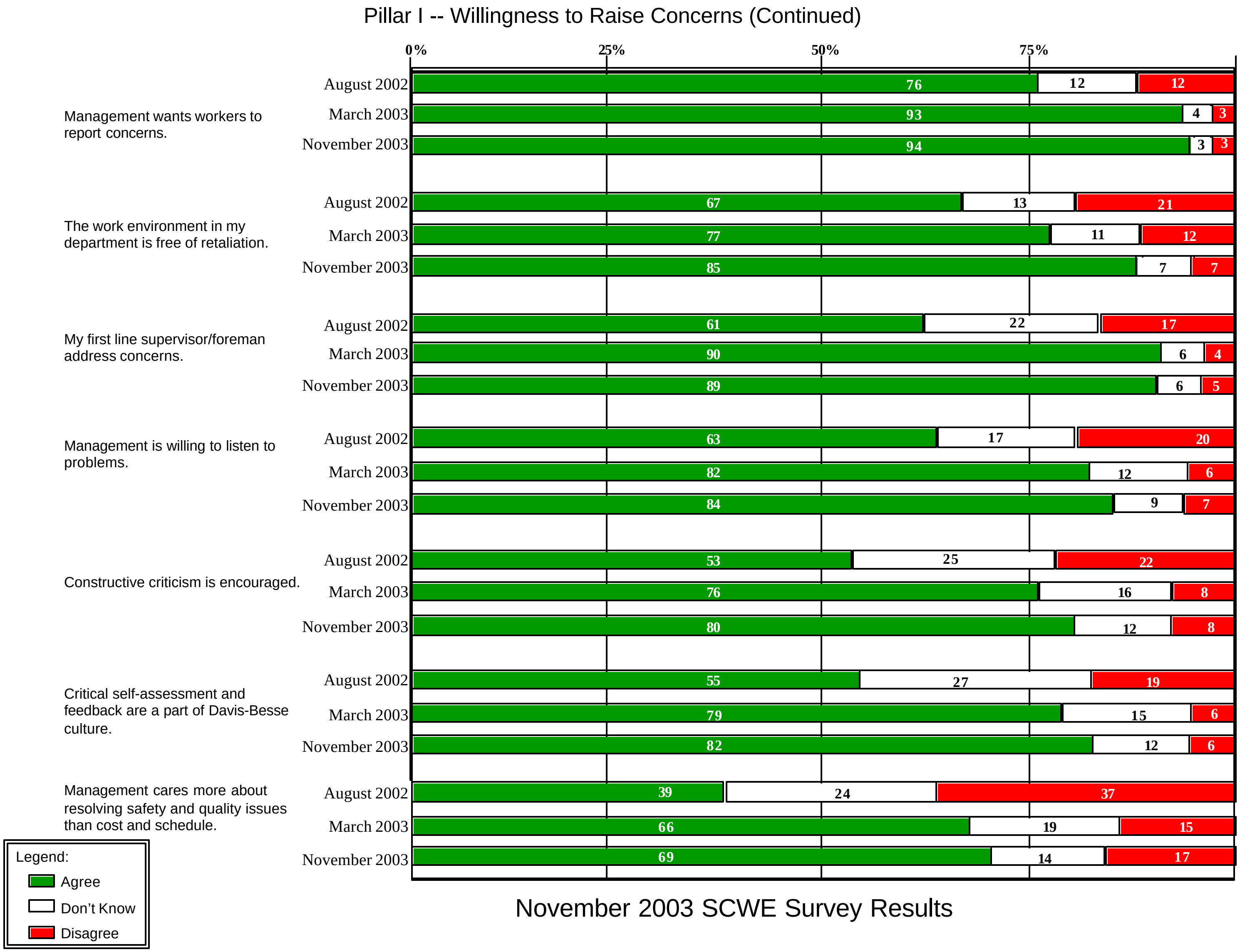
Table 1 -- Improvements in Results of SCWE Surveys

Pillar I -- Willingness to Raise Concerns



November 2003 SCWE Survey Results

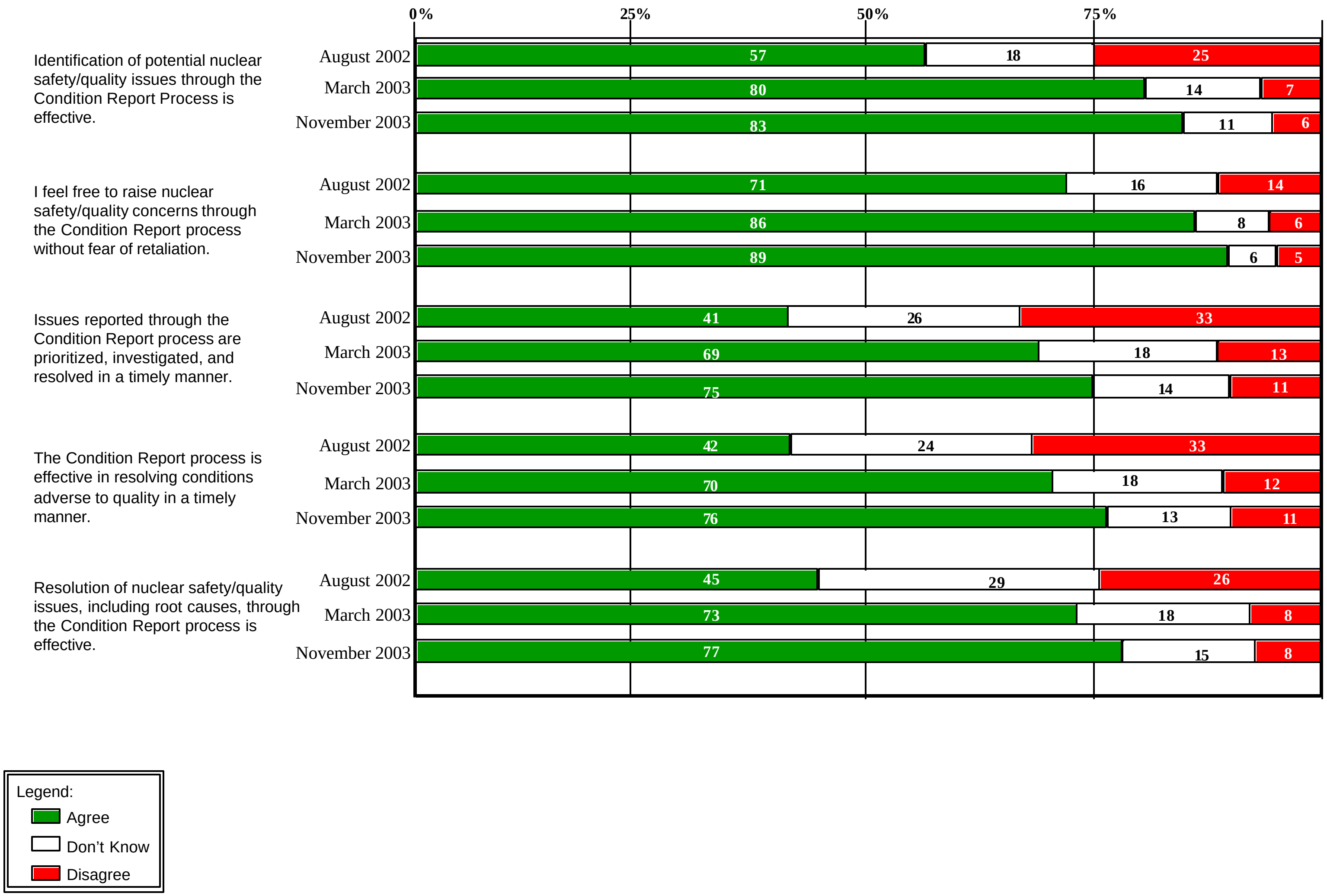
Table 1 -- Improvements in Results of SCWE Surveys (cont'd)



November 2003 SCWE Survey Results

Table 1 -- Improvements in Results of SCWE Surveys (cont'd)

Pillar 2 -- Normal Problem Resolution Process



November 2003 SCWE Survey Results

Table 1 -- Improvements in Results of SCWE Surveys (cont'd)

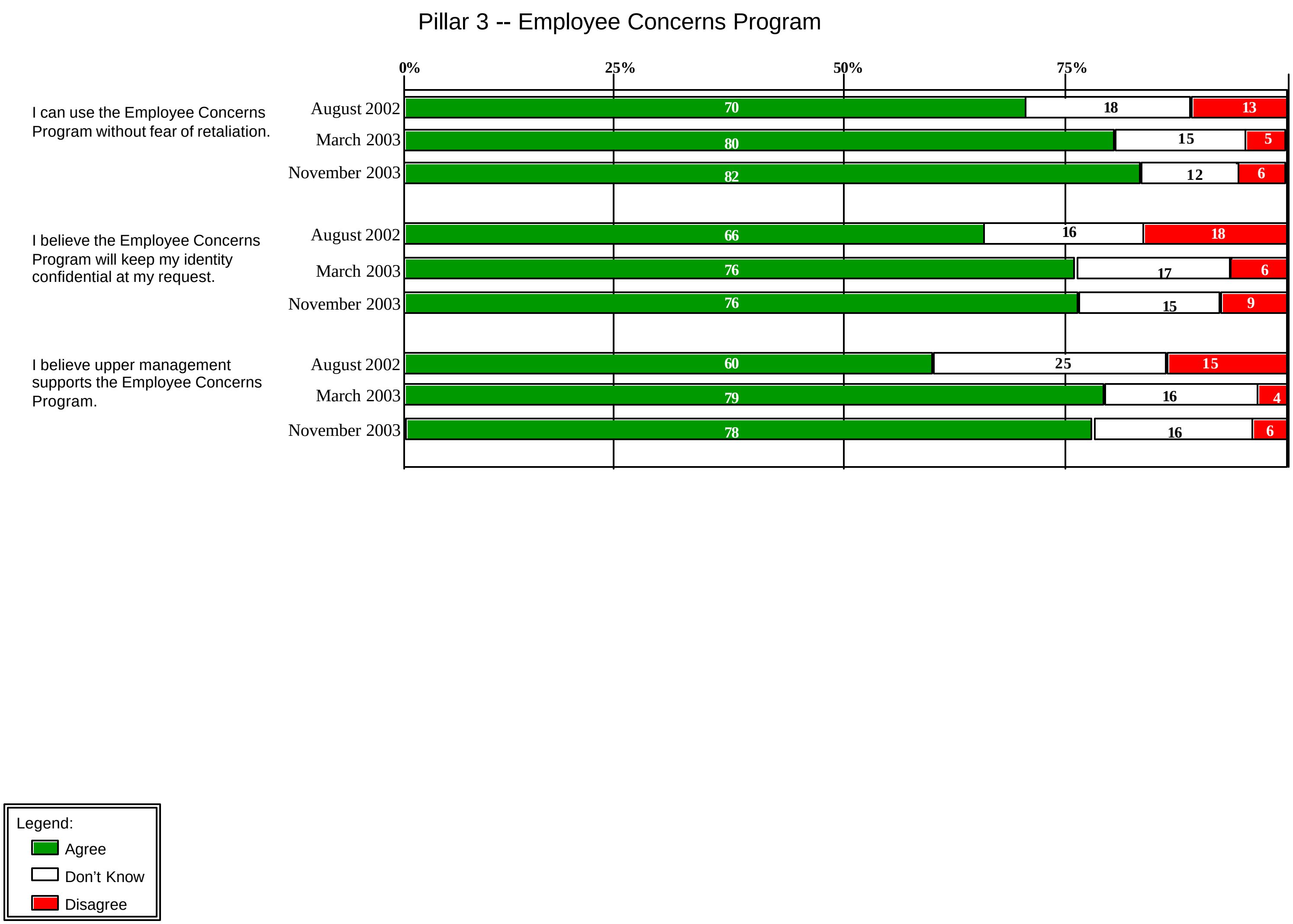
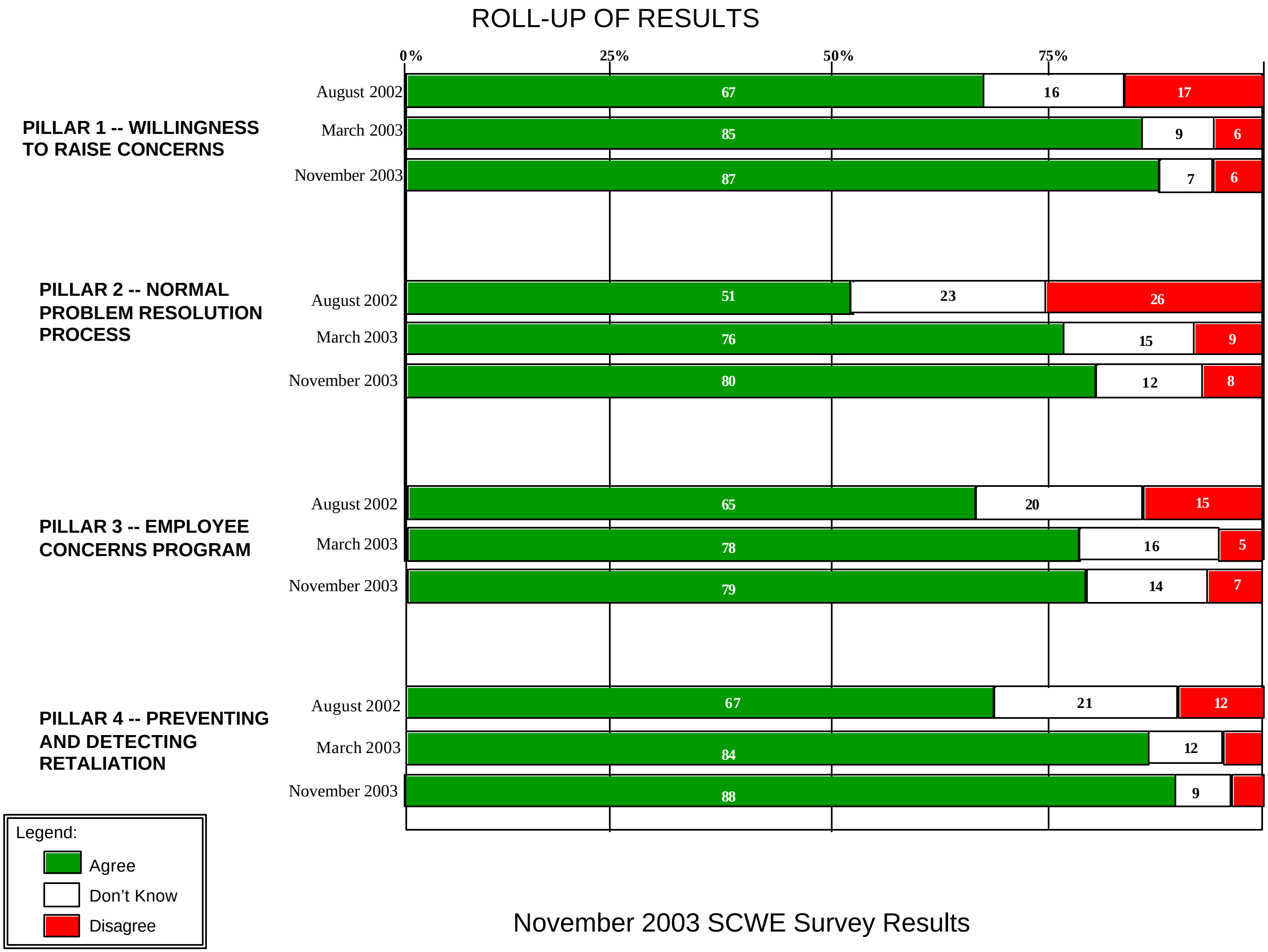


Table 1 -- Improvements in Results of SCWE Surveys (cont'd)

November 2003 SCWE Survey Results

Table 1 -- Improvements in Results of SCWE Surveys (cont'd)



November 2003 SCWE Survey Results

Table 2
Results of NQA Interviews in November 2003

	Question	Yes	No
Q1	Is there a difference between safety conscious work environment and safety culture?	93%	7%
Q2	What is the definition of each?	92% did	8% did not
Q3	Do you believe management wants employees to report problems and adverse conditions?	93%	7%
Q4	Give an example of a nuclear safety concern.	95% did	5% did not
Q5	Have you raised any issues since February 2003, via the corrective action program?	78% did	22% did not
	Was the issue adequately addressed?	82%	18%
Q6	Are you aware of any specific instances since February 2003 in which another individual raised an issue and considered the response incomplete or unacceptable?	23%	77%
	Or was retaliated against for raising the issue?	9%	91%
Q7	Are you aware of any specific events since February 2003 which would discourage employees from raising concerns (*e.g.*, chastisement for submitting condition reports, supervisor holding up submittals)?	14%	86%
Q8	Do you believe you can raise any nuclear safety or quality concern without fear of retaliation?	95%	5%
Q9	Since February 2003 have you seen a change in management expectations concerning nuclear safety and quality?	70% & 19% said always good	9%
Q10	Do you believe Davis-Besse personnel, including all levels of management, demonstrate the "right stuff" in making nuclear safety-focused decisions?	73% & 8% said yes/no	15%

Question	Yes	No
Q11 Do we apply the right level of effort for timely and effective corrective actions according to the level of significance of the identified issue?	74%	13%
Q12 Looking at the FENOC Davis-Besse safety culture model used during the Edventures-teamwork sessions, do you believe that:		
Individuals are ready for restart?	93%	2%
Plant management is ready for restart?	91%	7%
Policy/corporate level commitments support restart?	87%	8%
Q13 Do you believe we are ready for restart?	71% & 8% said close	21%

In summary, the results of the SCWE Survey and NQA interviews show convergence around overall positive SCWE and safety culture.

There is other evidence of the improved safety culture at Davis-Besse. For example:

- The need for leak tightness of the RCS has been emphasized. The NOP test of the RCS in September 2003 showed an unidentified RCS leak rate of approximately 0.008 gpm, which is the best in the history of Davis-Besse and far below the limit of 1.0 gpm in the Technical Specifications. Additionally, as discussed in Section IV.D, Davis-Besse has established a state-of-the-art RCS Integrated Leakage Program.

- The need for contamination control has been emphasized. As a result, most areas inside the containment are now sufficiently clean that personnel may enter the areas with minimal protective clothing.

- In 2002, the NRC was receiving about the same number of allegations regarding Davis-Besse as were being reported to Davis-Besse's Ombudsman. The number of concerns now being reported to the ECP far exceeds the number of allegations reported to the NRC. This demonstrates employee confidence in the ECP. Additionally, the number of allegations/concerns being reported to both the NRC and the ECP have been steadily dropping throughout 2003, indicating that employees have increased confidence in Davis-Besse management to resolve issues. This data is shown in Figure 9 on page 101 through November 20, 2003.

- In 2003, plant personnel performed a number of evolutions without any significant events, including the RCS pressure tests at 50 and 250 psig, and the containment integrated leak rate test. Additionally, in 2003, several events occurred at Davis-Besse, including a loss of offsite power and an inadvertent opening of a core flood valve in August, and a reactor trip in September, in which plant personnel responded appropriately to mitigate the event. Furthermore, with respect to the latter event, the evolution was stopped and appropriate corrective actions are being taken as discussed in Section V.C.

Additionally, various performance indicators show a good safety culture. For example, as of November 9, 2003:

- The Condition Report self-identification rate is 89 percent, which exceeds Davis-Besse's restart goal of 85 percent. Furthermore, Davis-Besse has been consistently meeting this goal.

- The individual error rate is 0.29 per 10,000 hours worked, which is better than Davis-Besse's restart goal of 0.45. Furthermore, Davis-Besse has been consistently meeting this goal.

- The rate of review of CRs by SROs within one day of initiation is 98 percent, which exceeds Davis-Besse's restart goal of 95 percent. Furthermore, Davis-Besse has been meeting this goal since August 2003.

- As discussed elsewhere in this report, Davis-Besse is also meeting its restart goals for management observations, engineering quality, program and process error rate, condition report category accuracy, and root cause evaluation quality.

As part of the Root Learning sessions conducted in the fall of 2003, a survey of site personnel was conducted to determine their perceptions of safety culture. The survey posed a series of questions based upon various characteristics associated with Davis-Besse's Safety Culture Model, and asked personnel to state their level of agreement (ranging from strongly disagree to strongly agree) on whether Davis-Besse possessed the safety culture characteristics in question. More than 700 individuals responded to the survey. The results of the survey were positive:

- On average, personnel agreed that Davis-Besse possesses the safety culture characteristics in each of the three Commitment Areas (Policy Level, Management Level, and Individual Level Commitment Areas).

- On average, personnel rated several safety culture characteristics at Davis-Besse between agree to strongly agree, such as awareness of policies on safety culture, visible commitment to safety, and understanding of responsibility to raise safety or quality concerns.

- Even for the lowest rated characteristics (*i.e.*, management values training development; cross-functional work management is evident; cross-functional communications is evident), personnel on average somewhat agreed that those characteristics exist at Davis-Besse.

- For 26 of the 30 characteristics, 84 percent or more of the personnel expressed some level of agreement that the characteristics exist at Davis-Besse. Even with respect to the remaining four characteristics (*i.e.*, management values training development; management values the qualifications personnel hold; cross-functional work management is evident; cross-functional communications is evident), more than two-thirds of the personnel expressed some level of agreement that the characteristics exist at Davis-Besse.

- Personnel rated several characteristics extremely highly. For example, approximately 95 percent or more of the personnel expressed some level of agreement with respect to personal awareness of policies on safety culture, understanding of the policies by employees in general, visible commitment to safety, Davis-Besse's goals are clear and understood, employees at Davis-Besse exhibit a drive for excellence, and persistence and urgency in identifying and resolving problems. Significantly, 99 percent of the personnel expressed some level of agreement that they have a responsibility to raise safety or quality concerns.

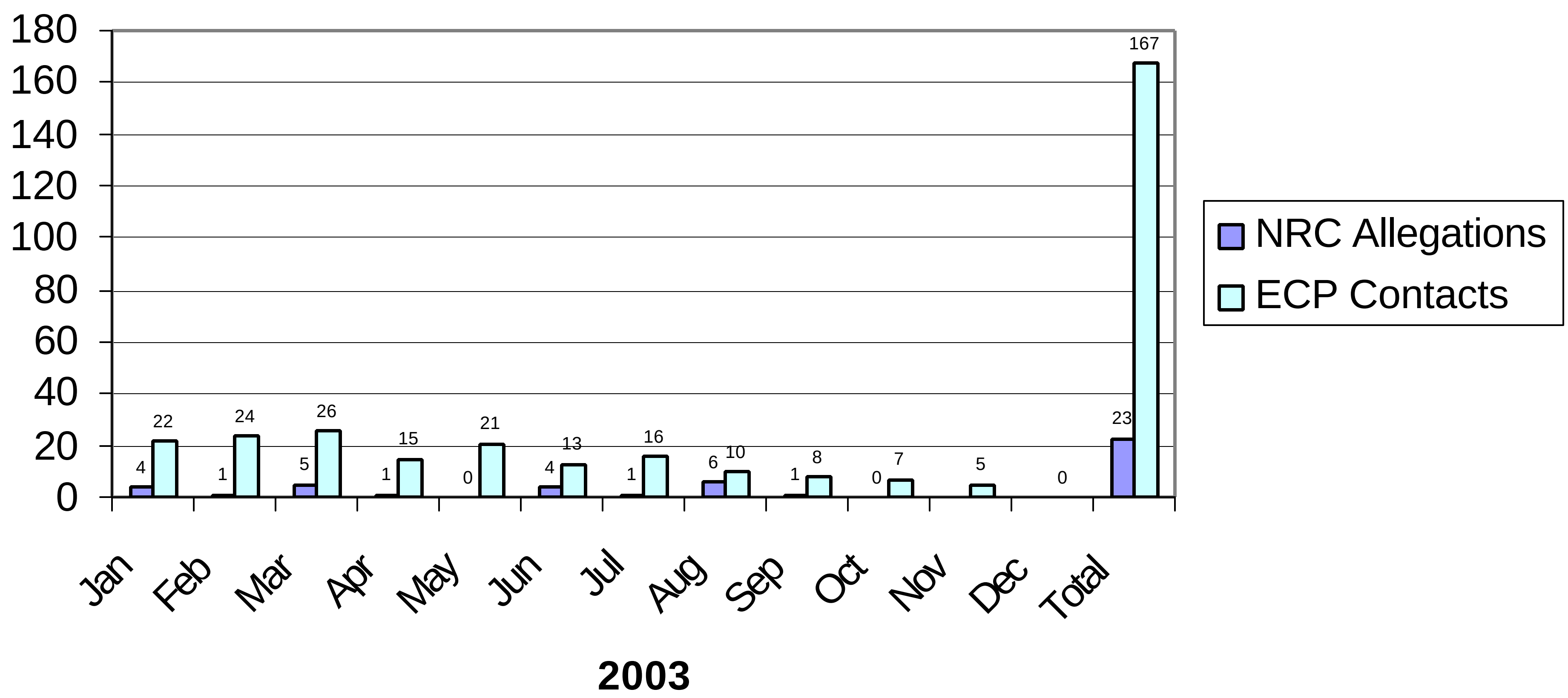
Furthermore, as of the end of October 2003, the year-to-date and 12-month rolling average days between events is 34 days, which is better than the target for 2003 (30 days).

Additionally, as discussed in Section V.A.1, Davis-Besse has demonstrated good safety culture through its actions, such as implementing modifications to add safety margin, installing state-of-the-art programs and systems, taking a conservative approach to safety, and imposing stand-downs and stopping work.

In summary, safety has the highest priority at Davis-Besse and takes precedence over other objectives, such as cost and production. Both formal and informal surveys demonstrate that site personnel feel free to raise safety concerns without fear of retaliation, and that concerns are investigated and resolved in a timely manner. Therefore, Davis-Besse concludes that it is ready for restart in this area.

Figure 9

NRC Allegations & ECP Contacts



3. Improvements in Standards and Decision-Making

Davis-Besse has the following objective for decision-making and technical assessments: *Decision-making and technical standards have a nuclear safety focus, have technical rigor, account for operating experience, and seek to correct problems rather than justifying acceptance of the problems.*

Actions to achieve this objective have included the following:

- Established standards and expectations for Davis-Besse.

- Implemented procedure NOP-ER-3001, "Problem Solving and Decision Making Process," which identifies responsibilities of plant personnel for decision-making, ensures the right safety focus, and prompts a questioning attitude.

- Implemented procedure NOP-CC-3002, "Calculations," to upgrade control and quality of calculations. This procedure includes requirements for design interface evaluations and reviews under 10 CFR § 50.59. Additionally, the new procedure includes a detailed design verification checklist.

- Provided initial training to reinforce technical standards and problem solving skills of the technical staff.

- Provided training to the Engineering department on lessons-learned from recent implementation of a revision to the modification process.

- As discussed in Section IV.D.2, made improvements to the Operating Experience Program to ensure appropriate actions identified from other plants or sources of information are properly tracked and implemented.

- FENOC stations (including Davis-Besse) are sharing resources and expertise among themselves and Davis-Besse has augmented its Engineering staff with outside personnel to provide new insights and experiences.

- The Operations section developed a plan to achieve the following goals: (1) Operations is recognized as the lead organization at Davis-Besse; (2) Continuous improvement is expected, demonstrated and embraced in the Operations Section; (3) Operations maintains ownership of equipment deficiencies, nuclear fuel performance, and plant; (4) Chemistry is strong; (5) Operations management communicates, demonstrates, and reinforces desired performance standards to operate the facility at desired levels; and (6) Shift management consistently demonstrates leadership to staff, craft, and oversight personnel.

- Developed a checklist for pre-job briefings. The checklist includes checks for participation by interfacing organizations, use of the latest procedures, calibration of equipment, and discussion of permits and controls, potentially hazardous conditions and precautions, work logistics and sequence, foreign material exclusion, critical work activities, operating experience, and avoidance of mistakes and self-checking.

- Implemented procedure NG-DB-00201, "Conduct of Infrequently Performed Tests and Evolutions." This procedure provides additional management oversight and control of infrequently performed tests or evolutions. The intent of this procedure is to maintain a high level of plant oversight.

Results

A number of performance indicators are used to measure improvements in the area of standards and decision-making, including:

- EAB Indicator – This indicator measures the quality of Engineering products, as determined by the EAB. The score is based on an assessment of quality in the following areas: Procedural Performance/Implementation, Rigor in Problem Solving, Team Approach, Analysis/Evaluation/Design, Design Basis Maintenance, and Licensing Basis Maintenance. The restart goal for this indicator is to achieve a 12-week rolling average of 1.0 or less. As of November 9, 2003, the value for this indicator is 0.7, and has met the 12-week rolling average goal for several months.

- Management Observation Indicators – The results of management observations are tracked in the Observation Card Database, and consist of observations of Field Activities, Operations, and Training. This indicator measures the percentage of management scheduled observations that are actually completed. The restart goal for this indicator is to achieve a 12-week rolling average of 90 percent or more management observations completed as scheduled. As of November 9, 2003, the value for this indicator is over 90 percent, and the 12-week rolling average has consistently exceeded the goal of 90 percent since April 2003.

- Open Control Room Deficiencies – This indicator measures the total number of open Control Room deficiencies, such as an inoperable process indicator, alarm function, or component status light and those deficiencies that prevent the operation of an automatic control system or hand operated control switch. The restart goal for this indicator is zero open Control Room deficiencies. As of November 9, 2003, the value for this indicator is four.

- Open Operator Workarounds – This indicator measures the total number of Level 1 and 2 Operator Work Arounds, which are defined as any equipment deficiency or plant condition which, during abnormal or emergency conditions, will increase operator burden or impede effective operator response. The restart goal for this indicator is zero Operator Work Arounds. As of November 9, 2003, the value for this indicator is eight (one is not planned for closure prior to restart).

- Open Temporary Modifications – This indicator measures the total number of open temporary modifications. The restart goal for this indicator is zero Open Temporary Modifications. As of November 9, 2003, the value for this indicator is five.

NRC inspections in the summer of 2003 and COO-sponsored assessments performed by an architect-engineering contractor in the fall of 2003 identified some issues with calculations (*e.g.*, calculations that did not identify the bases for assumptions; calculations that contained errors or used inadequate analytical methodologies). The contractor assessment identified that the new calculation procedure, NOP-CC-3002, in general, is a good procedure and a significant improvement from the previous calculation procedure. Enhancements to the new procedure, however, were recommended. In response to the identified issues, the actions taken to provide additional assurance that calculations being issued have appropriate quality include:

- Holding meetings with design engineers to ensure that they are aware of the calculational issues and the expectations for high quality calculations;

- Requiring EAB to review calculations using a checklist to assure the adequacy calculations;

- Requiring engineers to validate previously issued calculations prior to using them for new calculations; and

- Implementation of Calculation Utility Project electronic calculation program.

After restart, Engineering will provide engineers with examples of good calculations to use as models. Additionally, as part of the Operational Improvement Plan provided in Appendix D, a post-restart Calculational Improvement Plan will be implemented, which will ensure that the most important calculations (*e.g.*, calculations supporting the Technical Specification values) meet expectations.

The results of the assessments of the NOP Test in September 2003 showed that Davis-Besse was properly initiating the problem-solving and decision-making procedure, but that the quality of implementation was uneven. Section V.C discusses the actions that have been taken to improve the consistency of implementation of this procedure.

In summary, Davis-Besse recognizes that there is room for improvement with respect to the quality of its calculations and implementation of its problem-solving and decision-making procedure, and actions have been taken to achieve improvement in these areas. Overall, decision-making and technical standards at Davis-Besse have a nuclear safety focus, have technical rigor, account for operating experience, and seek to correct problems rather than justifying acceptance of the problems. Therefore, Davis-Besse concludes that it is ready to restart in this area, subject to completion of a few remaining restart actions as discussed in Section V.C.

4. Improvements in Oversight and Assessments

Davis-Besse has the following objective for oversight and assessments: *Davis-Besse has provisions for oversight and assessments, which are effective in identifying and obtaining correction of problems before they adversely affect safety*.

Davis-Besse's actions to achieve this objective have included the following:

- ROP was established, utilizing industry experts and community leaders, to provide an independent oversight and review of plant activities performed for restart of Davis-Besse.

- The EAB was established to review and reinforce higher and consistent standards for engineering and other selected technical documents. The EAB's critical reviews of products, along with feedback to the supervisor, reviewers and preparers, raise the standards of Davis-Besse personnel.

- A Restart Senior Management Team (RSMT) was established to review restart reports for items on the Davis-Besse IMC 0350 Restart Checklist.

- The NQA organization has performed a root cause analysis, sponsored an independent program review to uncover process and performance shortfalls, and implemented several improvements, including:

  - A process is in place to systematically improve the source documents and attributes for the auditing process in conjunction with the Continuous Assessment Process. The review process captures recommended improvements throughout the course of a year, which then supports a formal annual update of the program.

  - The organization has been changed so that the Quality Control Inspectors now come under the authority of the QA Manager. This improves the ability of the Oversight organization to assess field activities.

  - The importance of field (performance-based) observations has been emphasized to the assessors, and the observation database has been revised to allow the inspection setting to be readily recorded. The database provides a means to measure the assessors selection of inspection settings.

  - NQA adjusts its quarterly inspection plans based on plant activities projected for the upcoming quarter.

- The effectiveness of the CNRB has been reviewed and changes made to improve its safety focus. In particular, the CNRB now places less emphasis on status of plant activities and license amendment requests and engages in more review of key technical and safety issues, including reviews of the adequacy of activities during outages as well as operation. The following improvements were made to the CNRB:

  - NOP-LP-2006, "Company Nuclear Review Board (CNRB)," was issued in April 2003 and established and defined the organization, responsibilities, and administrative requirements to control the CNRB.

  - NOP-LP-2006 was reviewed by the Davis-Besse Program Review Board, which concluded that the procedure satisfies the concerns identified by the independent CNRB assessment.

  - NOP-LP-2006 establishes the Vice President of FENOC Oversight as having overall responsibility for the CNRB. This organizational arrangement eliminates the line conflict identified by the independent CNRB assessment.

  - NOP-LP-2006 requires that non-FENOC members of the CNRB be free of other assignments for the Company.

  - New members have been appointed to CNRB who have the necessary experience and qualifications to properly review issues involving safe operation of a nuclear power plant.

  - The CNRB chairman has communicated the importance of the CNRB, including the expectations of CNRB members that employees focus on safety or matters that affect safety.

- The PRC charter and membership has been changed to ensure proper level of management decision-making and to ensure items required for safe and reliable operations are not deferred.

- A formal restart readiness review process has been developed and implemented for plant restart activities. This process has provided structure and rigor for assessing the readiness of the plant to be restarted.

Results

Several actions have been taken to verify that the efforts to improve oversight and assessments at Davis-Besse are effective. For example, the following performance indicator has been used to measure improvements in oversight and assessments: the percent of management observations that are performed as scheduled. Trending of this data shows that, since spring 2003, management has consistently met or exceeded its goal of 90 percent.

Additionally, as discussed in Section V.B, the results of the NQA assessments of the NOP Test in September 2003 were similar to the results of the external assessors, thereby demonstrating the effectiveness of NQA.

NQA Assessment of the EAB

Throughout the performance of the Return to Service Plan, NQA has observed EAB activities. The EAB reviews have been consistently intrusive and have improved the quality of engineering products that they have reviewed.

NQA Assessment of the SLT and PRC

NQA observations of the PRC were often made in conjunction with SLT meetings. Generally, the NQA manager attended the SLT meetings and observed that management priorities and decisions on the scope of plant modifications were made with the appropriate emphasis on nuclear safety.

Additionally, during the NOP test in September 2003, an independent team of industry executives and managers assessed the oversight activities of NQA, as well as the oversight activities of line management. Additionally, NQA assessed management observations and oversight during the NOP test. In summary, Davis-Besse identified that its management observations could be more self-critical, and as discussed in Section V.C it has taken action to improve these observations. Additionally, NQA has recognized that its assessments are more effective when it uses outside personnel to assist in the assessments and NQA plans to continue to use non-Davis-Besse personnel in its assessments, as appropriate.

Conclusions

Overall, Davis-Besse has adequate provisions for oversight and assessments, and oversight and assessment have been effective in identifying and obtaining correction of problems before they adversely affect safety. Davis-Besse has identified opportunities for improvement, and has taken action to achieve improved performance. Therefore, Davis-Besse concludes that it is ready for restart in this area.

5. Improvements in Corrective Actions, Programs and Procedure Compliance

a. Corrective Action

Davis-Besse has the following objective for corrective actions: *Adverse conditions (including adverse trends) are promptly identified and documented. The root causes of significant conditions adverse to quality are identified, actions are taken to preclude recurrence of the conditions, and the preventive actions are effective.*

As discussed in detail in Section IV.D, the CAP has been significantly revised, including improvements in operability evaluations, categorization of conditions, cause evaluations, effectiveness of corrective actions, and the CARB.

Results

The following performance indicators are used to measure CAP improvements:

- Categorization – Davis-Besse monitors the percentage of CR categorizations recommended by the originator's supervision that do not require escalated categorization based upon the review by the Management Review Board (MRB). The goal is 90 percent. As of November 9, 2003, Davis-Besse meets this goal.

- Root Cause Quality – Davis-Besse monitors the cumulative percentage of root cause determinations presented to the CARB that were approved by that board. The restart goal is an improving trend and the long-term goal is 90 percent. As of November 9, 2003, Davis-Besse meets its long-term goal, and the quality of the root cause analyses has an improving trend since September 2003.

- CAP Effectiveness – Davis-Besse has a performance indicator for CAP effectiveness, which is a composite of four elements (CR self-identification rate, extended or delinquent CR investigations and corrective actions, repeat significant events, and CARB approval of root cause analyses). As of the end of October 2003, two of the elements were rated as Green (root cause analyses and repeat events), and one of the elements (self-identification rate) was rated as White even though it meets the restart goal. The element on percent extensions/delinquent was Red, which in turn caused the overall indicator to be rated as Yellow. This rating reflected the focus on completing restart actions needed for entering Mode 4 and deferral of non-restart actions, rather than a deficiency in the quality of performance.

Assessments have also been performed to measure performance in the area of corrective actions. For example, in the summer of 2003, NRC inspections and NQA assessments identified areas for improvement in corrective actions. Although they found that the root cause analyses were rigorous for Significant Conditions Adverse to Quality (SCAQ), they identified weaknesses with respect to apparent cause analyses for conditions of lesser significance. Additionally, they identified a need to resume trending of adverse conditions and to improve calculations that were prepared to support certain corrective actions.

In response, the following actions have been or will be taken prior to restart to address these issues:

- The procedural requirements for apparent cause analyses have been strengthened to specify the analytical methods to be used, to require evaluation of generic implications and prior relevant experience, and to provide a checklist for attributes for apparent cause analyses.

- The number of Apparent Cause evaluators will be reduced and additional training will be provided to the evaluators (currently scheduled to be completed in January 2004). Apparent Cause evaluators will receive initial and continued training, and will be required to meet proficiency requirements.

- The CARB is now performing assessments of the apparent cause analyses being issued, and these assessments will continue until the apparent cause analyses presented to CARB meet the goal for quality of apparent cause analyses.

- Condition Report Analysts within each section will receive strengthened roles and responsibilities with respect to apparent cause analyses. They will receive the same training as Apparent Cause evaluators, and will attend CARB meetings to enhance their standards for review and acceptance of apparent cause analysis. In the long-term as described below, the Analysts will assume CARB's responsibility for review and approval of apparent cause analyses.

- Trending of CRs has been resumed.

In addition, after restart, an Apparent Cause Review Group (a subcommittee of the CARB) will be established and will assess the adequacy of apparent cause analyses. These assessments will begin when the apparent cause analyses presented to CARB meet the goal for quality of apparent cause analyses. After that time, CARB will perform reviews of selected apparent cause analyses to provide additional assurance of their continued acceptability.

In general, the actions already taken at Davis-Besse have been effective in improving the quality of apparent cause analyses. A performance indicator has been implemented that measures the percentage of apparent cause evaluations accepted (approved or approved with comments) by the CARB. As shown in Figure 10 on page 112, the percentage of apparent cause evaluations accepted by the CARB has risen from 62 percent in May 2003 to 85 percent as of November 9, 2003, which is near Davis-Besse's goal of 90 percent. The additional actions should result in even further improvement in the initial apparent cause evaluations, and the additional barriers being put into place provide reasonable assurance of the acceptability of the final apparent cause evaluations.

The NRC's Corrective Action Team inspection identified weaknesses in calculations. The calculation improvement project has been included in the Operational Improvement Plan. The

SFVP described in Section IV.E.2, together with the associated corrective actions, provide reasonable assurance that the calculations and testing for safety-significant systems support the associated safety functions.

In summary, weaknesses were identified with respect to apparent cause analyses, and actions have been taken to strengthen these analyses and impose additional barriers to ensure the effectiveness of those analyses. Overall, adverse conditions (including adverse trends) are being identified and documented. Additionally, the root causes of significant conditions adverse to quality are being identified, actions are taken to preclude recurrence of the conditions, and the preventive actions are effective. Therefore, Davis-Besse concludes that it is ready for restart in this area.

b. Procedure Compliance

Davis-Besse has the following objective for procedure compliance: *Personnel comply with procedures as written or obtain appropriate revisions to procedures*

Actions to achieve this objective have included the following:

- The standards and expectations for procedure compliance and the need for work practice rigor have been reinforced.
- Licensed operators have been trained on their responsibilities for ensuring the safety of the plant and compliance with regulatory requirements and procedures.
- A Management Observation Program has been established to provide direct management observation of procedure compliance by employees.

<u>Results</u>

The following performance indicator is used to measure its improvements with respect to procedure compliance:

- Davis-Besse monitors the number of CRs (both CAQs and SCAQs) generated due to failure to follow procedures. The results of this indicator show that for the month ending November 9, 2003, approximately 13 percent of the CRs generated were for failures to follow procedures.

Assessments to measure performance in the area of procedure compliance include:

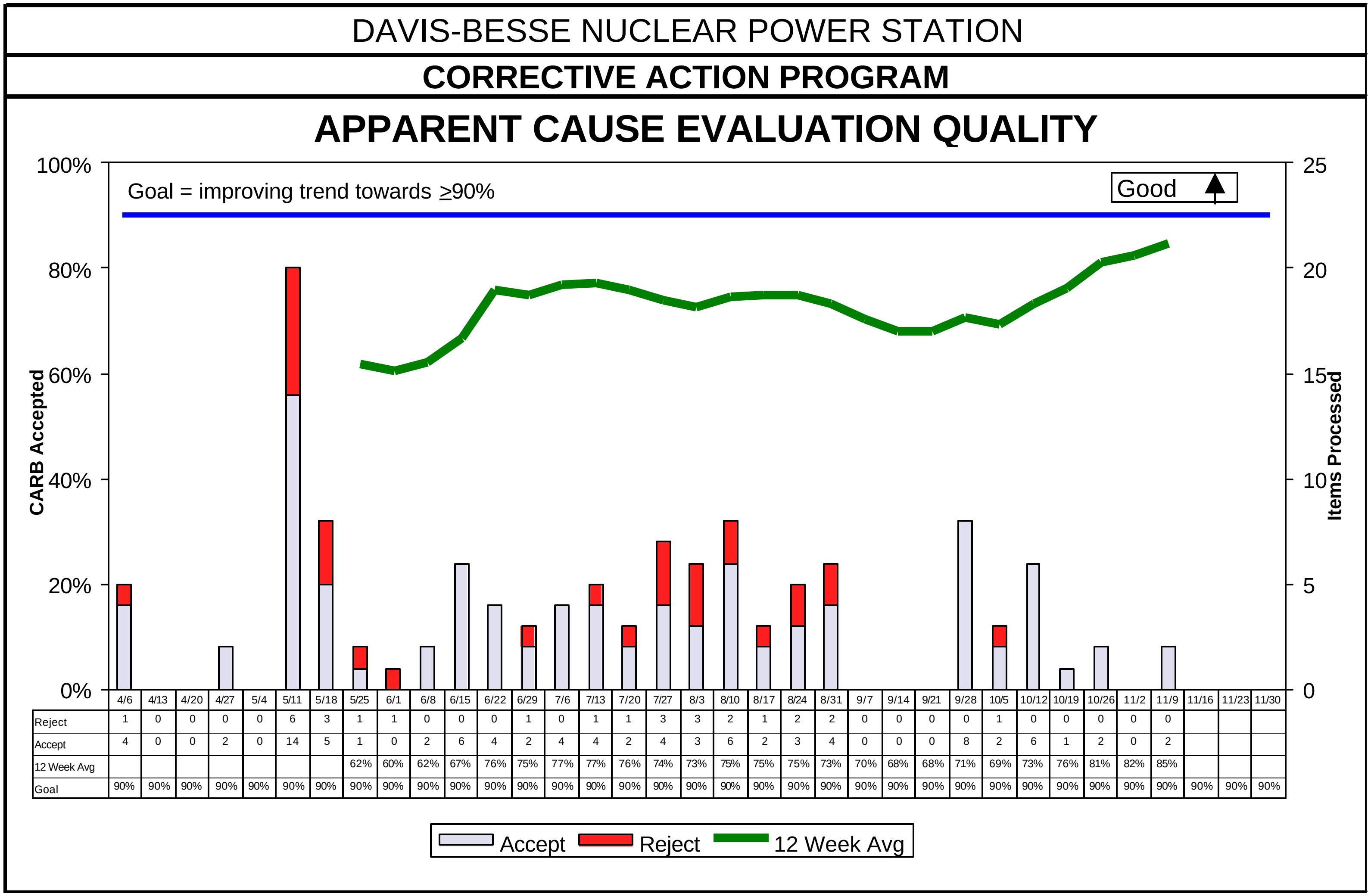
- On a semiannual basis, an evaluation is performed using human performance evaluation system (HPES) techniques to determine the causes of procedure noncompliance and develop actions to improve performance. The HPES evaluations show that there were several procedure compliance issues. Site personnel will be trained on proper procedure compliance prior to restart.
- Quality Assessment checks for procedure compliance as part of its oversight of plant activities. The evaluations from third quarter indicate that there were

approximately 175 CRs assigned with cause codes related to procedural compliance. During this quarter there were approximately 2,775 investigations of procedure non-compliance completed that represent approximately 6.5 percent of the total investigation. This data indicates that procedure compliance concerns categorized in the cause codes continues to trend upward. It is unclear if this trend represents actual declining performance or an increasing sensitivity to recognition and identification of procedure noncompliance. NQA will continue to actively assess this area in the fourth quarter.

During the NOP test, several events occurred when Operators proceeded to implement procedures that were ambiguous or lacked details. Maintenance personnel engaged in similar conduct in the summer of 2003. A collective significance review of these events was performed and identified procedure quality and usage as two areas needing improvement. The Operations Improvement Action Plan (discussed below in Section V.C) addresses these deficiencies, among others. Validation and training on the improved Operations procedures is scheduled for completion by December 5, 2003.

In summary, performance indicator data, assessments and management observations show that, overall, personnel are complying with procedures and are generating procedure change notices to improve those procedures. NQA is actively assessing procedure compliance with regard to trends. Actions have been and are being taken to ensure that personnel comply with procedures. Therefore, Davis-Besse concludes that it is ready for restart and safe operation in this area.

Figure 10 -- Apparent Cause Evaluation Quality



	4/6	4/13	4/20	4/27	5/4	5/11	5/18	5/25	6/1	6/8	6/15	6/22	6/29	7/6	7/13	7/20	7/27	8/3	8/10	8/17	8/24	8/31	9/7	9/14	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30
Reject	1	0	0	0	0	6	3	1	1	0	0	0	1	0	1	1	3	3	2	1	2	2	0	0	0	0	1	0	0	0	0	0			
Accept	4	0	0	2	0	14	5	1	0	2	6	4	2	4	4	2	4	3	6	2	3	4	0	0	0	8	2	6	1	2	0	2			
12 Week Avg								62%	60%	62%	67%	76%	75%	77%	77%	76%	74%	73%	75%	75%	75%	73%	70%	68%	68%	71%	69%	73%	76%	81%	82%	85%			
Goal	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%

c. Programs

A number of actions have been taken to ensure that Davis-Besse programs comply with NRC regulations, incorporate applicable operating experience, and are effectively implemented. These actions are summarized in Section IV.D above.

B. Results of Assessments of Performance During Normal Operating Pressure Tests

Three assessments of management and human performance were performed during the NOP tests in September 2003. NQA and an internal management assessment team performed assessments through observations of plant activities during the NOP test and interviews of personnel. In addition, an external team assessed performance during the NOP test, Davis-Besse performed a collective significance review of the information generated during the NOP test; the results are also incorporated below.

The findings of the internal and external assessment teams, NQA, and the collective significance review team included the following:

- Procedures – When implemented properly, the processes and procedures used at Davis-Besse support safe and reliable plant operations. The overall quality of procedures, however, appears to be weak in Operations (*e.g.*, too much flexibility in integrated operating procedures).

- Problem Solving and Decision-Making – Station management demonstrated safe and effective operational decision making principles when challenged by emergent issues. Situations requiring the use of the problem solving and decision-making procedure were promptly recognized. Good teamwork was displayed by personnel during problem solving and decision making activities. Inconsistencies were observed, however, in the implementation of the problem solving and decision-making procedure. Sometimes the teams diverted their attention toward troubleshooting, rather than following through on process requirements in the procedure.

- Management Observations and Coaching – New management team members were observed to display healthy self-critical behaviors. In general, however, station management needs to become more self-critical to support sustained performance improvement. When management observed performance shortfalls, coaching was not always applied. Additionally, internal management oversight was too heavily dedicated to observations of the Control Room. This diminished their opportunities to observe potential problems in activities that precede successful operation in the Control Room.

- Hardware – Management has aggressively improved plant and equipment material condition. Members of the External Assessment Team were impressed by the physical condition of the station. Additionally, NQA found that the plant displayed relatively leak-tight systems on both the primary and secondary systems, even on systems that have not been in service for some time, and that the plant walkdowns were generally effective in identifying issues requiring attention under the BACC program.

- Radiation Protection – Radiation Protection support of the NOP test was excellent. RP personnel involved with this activity were looking ahead, working through issues, and focused on providing the best "customer service" possible.

- Operator Performance – A few operational events occurred, including a reactor trip and automatic opening of the core flood tank valve. Performance shortfalls were identified in several operational areas, including monitoring and anticipating the impact of trends in plant parameters, pre-job briefs, and Just In Time training for Operators.

- Operations Management – Operations management did not always maintain oversight of plant activities, and instead sometimes became directly involved with troubleshooting and problem solving activities. Additionally, it was observed that the chain of command and control had become diluted during the outage, and that directions for plant operations sometimes arrived from multiple sources.

- Procedure Compliance – Procedural compliance weaknesses were observed in Operations, Maintenance, and Engineering. Some of the equipment issues observed during the NOP test were directly related to procedure use.

- Knowledge Base – A potential weakness in the knowledge base of some individuals was noted in the area of design and configuration control. Additionally, training during the outage was not adequate to return Operator knowledge and skills to the previous level during operations.

- Investigations of Events – The human performance weaknesses apparent in the core flood and steam line water hammer events were not adequate to prevent the reactor trip event, and the initial investigations for two events were not done in a timely manner.

- Trending – Trending of CRs was not yet fully implemented, but has since been reinstated under the CAP.

As discussed below, actions are being taken prior to restart to address the issues raised by the assessments and collective significance review.

C. Follow-up Actions

In response to the assessments described in the previous section, an Operations Improvement Action Plan has been developed. The Plan identifies actions to strengthen Operations personnel, operating procedures, Operations management, and independent oversight of Operations prior to restart. The primary restart actions in the Plan are discussed below.

Strengthening Operating Crews – Assessment and adjustment of operating crews is complete, providing strong crew alignment. In addition, the following actions have been or will be taken to strengthen Operations:

- Assessing Operators' knowledge of standards and expectations;
- Communicating expectations to operating crews and Operations training personnel;
- Reviewing expectations for the shift engineer during plant maneuvers, testing, off-normal and transient operations;
- Ensuring that the training and performance of the shift engineers is consistent with management expectations;
- Evaluating Operations standards and expectations for command and control responsibilities of shift management and revising them as necessary;
- Reaffirming the expectations for procedure use and adherence; and
- Assessing the selection criteria for Operations training instructors and Operations personnel and revising them as necessary.

Strengthening Operating Procedures – Operations will validate procedures in the simulator governing heatup/startup, shutdown/cooldown, and power operations, including comparison against industry best practices, and incorporation of lessons learned. Significant surveillance procedures and key Operations administrative procedures will be reviewed. Training on the revised procedures will be provided to Operators. Additionally, procedure guidance has been developed for reverse pre-job briefs (*i.e.*, Operators brief their supervisors on the activities they will be conducting) and training will be provided on reverse pre-job briefs.

Strengthening Operations Management – The onshift organizational chart will be revised to clearly define reporting roles and the chain of command. Additionally, operations oversight managers, consisting of personnel from FENOC and top performing plants, will be established to provide additional oversight of plant Operations until management determines they are no longer needed. Finally, training will be provided to site managers on performing management observations of Operations.

Strengthening Independent Oversight of Operations – NQA will perform focused observations of procedure use and Operations oversight, and will monitor the effectiveness of simulator training. NQA will also use non-Davis-Besse QA personnel to perform observations and to assess NQA's methodology for performing Operations assessments. Also, senior management will coach Operations management on performing monitoring and coaching.

Additionally, Operator training needs will be evaluated with respect to Operator tasks that have not been performed or trained upon over the past few years, and Davis-Besse will determine the appropriate training to be implemented.

In addition to these actions from the Operations Improvement Action Plan, other actions are being taken to address the issues identified in the assessments and collective significance review. For example, the Operations Manager will reinforce his expectation that initial investigations and personal statements be collected immediately after significant events, and that preliminary causal findings and lessons learned be disseminated to the shift crews to help reduce the probability of recurrence.

Actions are also being taken to strengthen implementation of the problem solving and decision-making process. For example, a process owner/facilitator will be identified to improve the consistency of implementation of the process.

In total, these restart actions will enhance barriers and improve operational performance to address the areas of weakness identified by the assessments during the NOP test. Through the use of the operational oversight team discussed above, Davis-Besse will verify that these actions and barriers are effective.

D. Conclusions

During the current outage, extensive actions have been taken to improve management and personnel development, safety culture, standards and decision-making, oversight and assessments, and corrective actions, programs, and procedure compliance. Various performance indicators and assessments demonstrate that these actions have been largely effective in achieving improved performance. Recent assessments have identified some areas of weakness related to apparent cause analyses, calculations, and operations. Davis-Besse has identified actions to address these weaknesses, and is in the process of implementing these actions. As a result, Davis-Besse concludes that, upon completion of implementation of these actions, it will be ready for restart and safe operation in this area.

VI. Long-Term Improvement Plans

Two plans have been developed to implement long-term improvements. The first plan is the Safety Culture Long-Term Improvement Plan, described in Section VI.A below. The second plan is the Operational Improvement Plan, described in Section VI.B below.

A. Safety Culture Long-Term Improvement Plan

The purpose of the Safety Culture Long-Term Improvement Plan is to identify long-term actions to address the areas for improvement identified in safety culture assessments at Davis-Besse and to provide for additional assessments to ensure the effectiveness of those actions. The Plan uses the actions in the Management & Human Performance Improvement Plan as a foundation, and acts as the successor to that plan after restart to ensure that a comprehensive set of actions are in place to address known weaknesses and achieve excellence in safety culture. The Plan is structured using the same approach as the Safety Culture Model.

The actions that have already been completed and those to be completed under the Plan are summarized below.

1. Actions in the Policy Commitment Area

In July 2003, FENOC's Executive Leadership Team established a new vision for its fleet of nuclear plants. The new vision is *"People with a strong safety focus delivering top fleet operating performance.*" To help achieve this vision, the team identified four (later expanded to five) strategic objectives and a set of metrics to track success in achieving the objectives. These strategic objectives and metrics are identified below:

- Safe Plant Operation
  - Risk Performance Indicator
  - OSHA Recordable Injuries
- People Development and Effectiveness
  - Talent Management and Personnel Development
  - Leadership Development
  - Long-Term Staffing Plans
  - Training
  - Safety Culture Performance Index
- Excellent Material Condition
  - Corrective Maintenance Backlog

  - System Health
  - INPO Index

- Fleet Efficiency/Effectiveness

  - Corrective Action Program Effectiveness
  - People per Megawatt Installed
  - Gross Margin
  - Non-Outage, Non-Fuel Production Costs
  - Degree of Standardization

- Improved Outage Performance

  - Capacity Factor
  - Refueling Outage Cost
  - Refueling Outage Duration

2. <u>Management Commitment Area</u>

In May 2003, a new department and position, Director of Organizational Development, was created to focus on achievement of continuous improvement in safety culture and SCWE. In September, this position transitioned into a FENOC corporate position to ensure alignment and improved safety culture throughout the organization.

In direct response to the root causes of the Davis-Besse RPV head degradation, several actions were taken concerning the Management Observation Program. For example, managers are spending more time in the field observing critical path and daily activities, which:

- Fosters management alignment;
- Raises awareness of cross-disciplinary activities;
- Emphasizes high standards and the ability to be critical;
- Addresses undesired actions and creates prospective opportunities for improvement; and
- Ensures open communications and on-the-spot recognition of positive behaviors.

Additionally, changes to the Management Observation Program are under way:

- On a periodic basis, the results of management observations are evaluated to identify areas in which there is a relatively high rate of observations of unsatisfactory performance. These areas become focus areas for increased management observations and are documented on CRs to track appropriate corrective action.

- The Training section has begun using the Management Observation Program to find weaknesses and needed focus areas.

Other actions are planned by FENOC to improve management oversight of plant activities. These actions include development of common processes for areas such as configuration control, equipment reliability, materials and services, outage management, support services, training, radiation protection, chemistry, design programs, and work management (*e.g.*, determining the appropriate level of management oversight based on safety and potential consequences of the work). Benchmarking industry best practices is part of the development process.

A focus of the long-term actions is to improve leadership, teamwork and alignment. Planned actions in each of these areas are summarized below.

Team Alignment

The SLT, in concert with the ELT, is holding a series of meetings to gain consensus on its role in leading the culture change effort, develop check points along the way to monitor progress in leading the site forward, discuss and agree on the training/skill sets needed for the leadership team and site to support the culture change effort and drive to achieve the new vision for Davis-Besse, and determine the structures and infrastructures that need to be in place to drive new patterns in behavior.

Additionally, a series of meetings are being held between the SLT, managers, and supervisors to share outcomes of the SLT Alignment meeting (thinking and direction), and to discuss the vision, organizational structures and infrastructures.

All-hands meetings are being held with site personnel to reinforce FENOC's new vision, engage site personnel in that vision, align site personnel to the culture change effort, create opportunities to gain insight into issues of concern, and gain an understanding of what actions can be taken to ensure that behavior is consistent with the new vision.

Management and Succession Planning

Improvements will be made to management and succession planning. Davis-Besse will implement the FirstEnergy integrated process of recruiting talent, identifying talent, proactively identifying needs and planning to fill vacancies as they become open, developing a rotation strategy for personnel, and providing feedback regarding their potential and the corporation's desires for the individual and rotation moves and timing.

Leadership Development

FENOC will establish a leadership development curriculum for the training of managers. The purpose of this curriculum will be to provide a systematic approach for the development of new leadership approaches and corresponding behaviors for FENOC managers. The elements of this curriculum will enable managers to foster personal, team, and system dynamics that empower FENOC employees to create the highest levels of nuclear safety and nuclear professionalism, and achieve continuous improvement in performance.

3. Actions in the Individual Commitment Area

Davis-Besse has continued to use stand-downs as a means of communicating performance shortfalls and emphasizing the actions that personnel need to take to avoid such problems. Additional case study training was provided to station personnel on the meaning and importance of safety culture, management's commitment to safety culture, examples of good and bad safety culture, and the role of station personnel in achieving a good safety culture. This training will be conducted for new personnel. Additionally, Edventures "root learning" training has been provided to Davis-Besse personnel. This training addressed the causes of the current outage, what has been done to correct the causes, and Davis-Besse's goals for the future. Through a series of questions, employees received training in their role in the causes, corrective actions, and goals, to enable employees to understand how their performance contributes to Davis-Besse's overall success.

Davis-Besse completed its personnel evaluation of non-union employees. The Performance Management process is being merged into a new FirstEnergy-wide personnel evaluation program. This new program will include easy to use evaluation forms that have five rating categories to provide greater feedback to personnel. Directors and managers will be attending a Leadership Academy to improve management skills, including performance evaluations.

A number of improvements related to SCWE will be implemented, including:

- SCWE training was provided for all groups of site personnel, including contractor personnel. This training stressed management's commitment to SCWE, the freedom of personnel to raise concerns without fear of retaliation, and methods for raising employee concerns. SCWE training will also be provided to new employees and contractors during employee orientation or in-processing.

- The results of ECP feedback to employees who raise concerns and the results of SCWE collective significance reviews will be publicized in order to increase confidence in the effectiveness of the ECP. This publicity will be structured to avoid compromising the confidentiality of those employees.

Focus groups of employees will be established to obtain additional feedback. The focus groups will consist of randomly selected employees, who will meet with an independent consultant to provide any issues or concerns for action by management. Additionally, these groups will be asked to complete surveys to obtain further feedback from employees.

4. Assessments of Effectiveness of Improvements

In addition to the improvement actions described in the Safety Culture Long-Term Improvement Plan, assessments will be conducted to monitor improvements in performance, and will adjust its actions as necessary to ensure that long-term goals will be achieved. In addition to its normal oversight (*e.g.*, periodic NQA assessments, EAB assessments of Engineering products, CARB assessments of root cause analyses, CNRB assessments), the following periodic management assessments and independent assessments will be performed after restart:

Periodic Management Assessments

- Monthly Performance Monitoring – In accordance with its strategic objectives, FENOC is establishing a metric to monitor safety culture. The performance indicators are currently in development using system-wide information. FENOC will begin monitoring these performance indicators once they are implemented as part of the 2004 FENOC Business Plan.

- Management Observation Program – This program has been implemented. The results from the program are trended to provide an indication of the performance of management personnel as well as personnel in the field. When weaknesses in performance are identified, corrective actions are taken to improve overall performance.

- Safety Culture Assessments – The current safety culture assessment process in Business Practice DBBP-VP-0002, "Restart Readiness Review Extended Plant Outage," has been transformed into a Business Practice. Safety culture assessments will initially be performed at least once every two years.

Independent Assessments

- NQA Assessments – NQA will continue to perform assessments of safety culture, including interviews of personnel. Assessments will be conducted on an annual basis.

- SCWE Surveys – The ECP group will continue to conduct surveys of the station personnel to determine their views related to the condition of SCWE at Davis-Besse. Surveys will be conducted annually.

- Assessment Using PSHA Methodology – An independent contractor will perform an assessment of safety culture at Davis-Besse using a methodology similar to that previously employed by PSHA. The assessment will be performed in the fourth quarter of 2004.

B. Cycle 14 Operational Improvement Plan

The purpose of the Operational Improvement Plan is to identify long-term actions to achieve additional improvement in operational performance at Davis-Besse and to provide for additional assessments to ensure the effectiveness of those actions. The Plan is structured around the management and human performance barriers to preventing events.

The Plan is attached as Appendix D and is summarized below:

- The Plan is designed to strengthen the four management and human performance barriers to preventing events: Individuals, Programs, Management, and Oversight.

- The Plan identifies initiatives to improve operational performance. Each of the initiatives relates to one or more of the barriers. These initiatives are as follows:

    - Organizational Effectiveness Improvement
    - Operations Improvement
    - Maintenance Improvement
    - Training Improvement
    - Work Management Improvement
    - Engineering Improvement
    - Continuous Safety Culture Improvement
    - Corrective Action Program Improvement
    - Procedure Improvement
    - Internal and External Oversight Improvement

- A number of performance indicators and goals have been identified to monitor selected attributes for the four barriers.

In summary, Davis-Besse has a comprehensive long-term plan to improve operational performance, including long-term goals, actions to achieve those goals, and tools to monitor progress in achieving the goals.

C. <u>Conclusions</u>

Additional long-term actions will be taken to anchor improvements in safety culture and operational performance at Davis-Besse. Additional assessments of safety culture will be performed to verify that these actions are effective, and Davis-Besse will be monitoring operational performance through the use of performance indicators. Additional actions will be taken, as needed, for any weaknesses that may be identified. These actions will ensure that Davis-Besse will achieve sustained, long-term improvements in safety culture and operational performance.

VII. Comparison Against NRC Criteria

The NRC has identified a number of criteria or factors for use in evaluating the readiness of Davis-Besse to restart and resume safe operation. These are identified in NRC's Restart Checklist and NRC's Confirmatory Action Letter. Additionally, recommendations for restart will be provided by FENOC's independent oversight groups.

A. NRC Restart Checklist

The NRC's Restart Checklist consists of seven categories:

- Adequacy of root cause determinations;
- Adequacy of safety-significant SSCs;
- Adequacy of safety-significant programs;
- Adequacy of organizational effectiveness and human performance;
- Readiness for restart;
- Licensing issue resolution; and
- CAL resolution.

There are 31 individual items in the Restart Checklist. As discussed in Appendix B, of these items, the NRC closed 23 as of November 12, 2003. With respect to the remaining eight items:

- Davis-Besse has completed the actions needed to close three of the items, has issued the associated closure packages, and is awaiting NRC closure of the item.
- For Item 2.e (HPI Pumps), Davis-Besse has modified the pumps in accordance with the plans described to the NRC in a meeting on October 21, 2003, and is in the process of installing and performing post-modification tests of the pumps to ensure their proper installation and performance.
- For Items 5.b and 5.c, restart readiness reviews are complete for Modes 6, 5, and the first Mode 4. Similar restart readiness reviews will be performed for the second Mode 4 and Mode 2, and the plant will not enter either of these modes if the results of the readiness reviews do not satisfy the standards in Business Practice DBBP-VP-0002, "Restart Readiness Review Extended Plant Outage."
- For Item 5.c, an Operations Improvement Action Plan to improve the performance of Operations is underway. As described in that Plan, there are provisions for monitoring performance of Operations.
- Item 7.a pertains to resolution of the commitments in the Confirmatory Action Letter, which is discussed in the next section.

In summary, actions are complete for almost all of the items on the NRC Restart Checklist. The remaining actions are well defined, subject to well-defined acceptance criteria, and scheduled for completion prior to restart. Therefore, subject to completion of these remaining actions, Davis-Besse is ready for restart under NRC's Restart Checklist.

B. Confirmatory Action Letter Resolution

As discussed in Appendix B, there are six commitments in the CAL. Of these six, the NRC has closed three of the commitments, and actions are complete for two of the three remaining.

The only remaining commitment is to hold a meeting with the NRC to discuss the root cause determination, extent of condition evaluations, and corrective actions completed and planned to repair the damage and prevent recurrence, and to obtain NRC approval for restart. Davis-Besse and NRC are making arrangements for this meeting, and one of the purposes of this report is to support the discussions in that meeting.

Subject to completion of the restart meeting with the NRC, Davis-Besse has satisfied the commitments in the CAL and is ready for restart.

C. Recommendation for Restart by Oversight Groups

The ROP was established to provide additional oversight and review of plant activities performed as part of the Return to Service Plan. The ROP consists of independent industry experts and FENOC executives with extensive experience in recovery efforts at plants with long outages. The ROP has conducted monthly meetings to review plant activities, and has conducted its own evaluations of performance (including review of plant documents, observation of plant activities, and interviews of plant personnel).

The ROP and CNRB will meet prior to restart to reach a conclusion on whether Davis-Besse is ready for restart. Additionally, based upon the results of its various assessments, NQA will also reach a conclusion on whether Davis-Besse is ready for restart.

VIII. Conclusions and Readiness to Restart

Based upon the following factors, FENOC concludes that it is ready to restart subject to completion of a few remaining restart actions:

- The actions specified in the NRC Confirmatory Action Letter and the NRC Restart Checklist are complete.
- The degraded RPV head has been replaced. The new head has been inspected and tested to confirm its acceptability.
- Walkdowns inside and outside containment have been conducted to identify other SSCs that may have been affected by boric acid corrosion or primary water stress corrosion cracking, and appropriate corrective action was taken for such components (including replacement of the Containment Air Coolers).
- The root causes that led to the degradation of the head have been determined, including the causes of the failure to identify the degradation.
- To determine whether other SSCs and programs may have been adversely affected by these root causes, extensive System Health Assurance Reviews and Program Compliance Reviews were performed. Based upon these reviews and the root causes, numerous improvements have been made to both SSCs and programs. Additionally, a number of plant modifications have been implemented to improve the safety margin of the plant.
- Based upon the root causes, numerous actions have been taken to improve management and human performance, including safety culture. Assessments and performance indicators have shown that these improvements have been effective in achieving improved performance.
- To anchor the improvements in management and human performance and ensure that these improvements will be sustained over the long term and to achieve still further improvements in performance, long-term improvement plans have been developed and are being implemented.

A number of activities must still be completed before Davis-Besse will be ready to enter Mode 2, for example, completion of the testing of the HPI pumps, completion of the breaker coordination modifications, and completion of various restart actions as discussed in this report. Davis-Besse currently expects, however, that these activities will be completed by mid-December 2003.

Based upon the above, FENOC concludes that the SSCs, programs, and personnel will be ready to support safe and reliable operation upon completion of these work activities. As a result, FENOC requests that the NRC approve restart of Davis-Besse.